

# Taxonomic revision of Oriental *Meranoplus* F. SMITH, 1853 (Insecta: Hymenoptera: Formicidae: Myrmicinae)

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## Abstract

The Oriental species of *Meranoplus* F. SMITH are revised. Fourteen species are recognized, seven of which are herein described as new: *Meranoplus biliran* sp.n. (Philippines), *M. boltoni* sp.n. (Sri Lanka), *M. borneensis* sp.n. (Sabah, E-Malaysia), *M. loebli* sp.n. (Sri Lanka), *M. malaysianus* sp.n. (Malaysia, Indonesia), *M. montanus* sp.n. (Borneo) and *M. nepalensis* sp.n. (Nepal). Lectotypes are designated for *Meranoplus bellii* FOREL, *M. bicolor* var. *lucidus* FOREL, *M. bicolor* var. *fuscescens* W.M. WHEELER, *M. castaneus* ssp. *hammaceros* FOREL, *M. laeviventris* EMERY, *M. laeviventris* var. *punctulatus* EMERY and *M. rothneyi* FOREL. The following new synonyms are established: *Meranoplus bellii* FOREL (= *M. carinatus* DONISTHORPE syn.n., = *M. flaviventris* DONISTHORPE syn.n.), *Meranoplus bicolor* (GUÉRIN-MÉNEVILLE) (= *M. bicolor* var. *lucidus* FOREL syn.n., = *M. bicolor* var. *fuscescens* W.M. WHEELER syn.n.), *Meranoplus castaneus* F. SMITH (= *M. castaneus* ssp. *hammaceros* FOREL syn.n., = *M. bellii* ssp. *javanus* KARAVAIEV syn.n.), *Meranoplus laeviventris* EMERY (= *M. laeviventris* var. *punctulatus* EMERY syn.n.). Distributional data are given and external morphological characters are illustrated. A key to the species is presented.

**Key words:** Insecta, Hymenoptera, Formicidae, Myrmicinae, *Meranoplus*, Oriental Region, taxonomy, new species, lectotypes, new synonymies.

## Zusammenfassung

Die Gattung *Meranoplus* wird in der Orientalischen Region revidiert. Vierzehn Arten werden besprochen, von diesen werden sieben als neu beschrieben: *Meranoplus biliran* sp.n. (Philippinen), *M. boltoni* sp.n. (Sri Lanka), *M. borneensis* sp.n. (Sabah, Ost-Malaysia), *M. loebli* sp.n. (Sri Lanka), *M. malaysianus* sp.n. (Malaysia, Indonesien), *M. montanus* sp.n. (Borneo) und *M. nepalensis* sp.n. (Nepal). Für *Meranoplus bellii* FOREL, *M. bicolor* var. *lucidus* FOREL, *M. bicolor* var. *fuscescens* W.M. WHEELER, *M. castaneus* ssp. *hammaceros* FOREL, *M. laeviventris* EMERY, *M. laeviventris* var. *punctulatus* EMERY und *M. rothneyi* FOREL werden Lectotypen festgelegt. Folgende neue Synonymien wurden festgestellt: *Meranoplus bellii* FOREL (= *M. carinatus* DONISTHORPE syn.n., = *M. flaviventris* DONISTHORPE syn.n.), *Meranoplus bicolor* (GUÉRIN-MÉNEVILLE) (= *M. bicolor* var. *lucidus* FOREL syn.n., = *M. bicolor* var. *fuscescens* W.M. WHEELER syn.n.), *Meranoplus castaneus* F. SMITH (= *M. castaneus* ssp. *hammaceros* FOREL syn.n., = *M. bellii* ssp. *javanus* KARAVAIEV syn.n.), *Meranoplus laeviventris* EMERY (= *M. laeviventris* var. *punctulatus* EMERY syn.n.). Die Verbreitung der Arten wird diskutiert, morphologische Kennzeichen sind abgebildet und ein Schlüssel zu den Arten wurde erstellt.

## Introduction

The genus *Meranoplus* is revised in the Oriental zoogeographical region. The term "Oriental Region" is here used in its classical sense, which means that the region reaches as far east as Wallace's Line (CRANSTON & NAUMANN 1970) and includes the Malay Peninsula, the Sunda Shelf area and the Philippine Islands. The use of this geographical

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range was a consequence of the distribution patterns of some of the treated species and their relationships, which here match this "classic concept" better than the one given in BOLTON (1994), excluding the areas mentioned above from the Oriental Region, and including these parts in a separate, Indo-Australian Region which goes as far east as New Guinea and the Pacific Islands.

Of the species treated here only *Meranoplus bicolor* is widely distributed throughout the entire Oriental Realm. The range of this most common Oriental *Meranoplus* reaches from Sri Lanka, passing through the entire Indian Subcontinent, including Pakistan in the west, Nepal and Bhutan, and going farther eastwards to South China, including Taiwan and Hong Kong; southeastwards it goes as far as Java (Fig. 30). The second common species with a relatively wide range is *M. mucronatus*, the distribution of which reaches from Myanmar southwards, passing through the Malay Peninsula to Sumatra (Fig. 31). *Meranoplus castaneus*, more rarely found than the two preceding species occurs from Thailand south- and southeastwards as far as Borneo. *Meranoplus bellii* and *M. rothneyi* are confined to the Indian Subcontinent; all the remaining species show more or less restricted, spotty distributions within the Oriental Realm.

*Meranoplus* species occurring eastwards of the Wallacea, particularly those occurring in the Papuanian Region (New Guinea and Pacific Islands), mostly are either members of an independent fauna, or they are even more closely related to the fauna of continental Australia. Therefore these species will be treated in a separate study, covering the Australian and Papuanian Realms. However, some *Meranoplus* species-groups occur in the entire distribution range of the genus.

*Meranoplus armatus* F. SMITH, originally described from "Sumatra" (or "Celebes" [= Sulawesi], see also F. SMITH 1862: 413, TAYLOR 1990: 35) was recognized to be a senior synonym of *M. rugifrons* EMERY, 1897, a species from New Guinea, by TAYLOR (1990: 35). BOLTON (1995) gives only Sumatra as the type locality of *M. armatus*. *Meranoplus rugifrons*, frequently found in New Guinean samples, occurs in Australia (northern Queensland) as well (TAYLOR 1990: 36). On the other hand this species was not present in any sample from Sumatra inspected for the current study. Therefore "Celebes", the latter locality given by F. SMITH (1862), is here believed to be the more probable (unless both of them are wrong), since Sulawesi in many faunal aspects shows more affinities to the Papuanian fauna than does Sumatra (unfortunately no material from Sulawesi could yet be examined though). Thus *M. armatus* is here excluded and will be treated elsewhere in an Australian context.

The genus *Meranoplus* was first revised in the Ethiopian zoogeographical region by BOLTON (1981). A historical review of the genus and a detailed general diagnosis of workers are given. Furthermore a review of the tribe Meranoplini was presented in that paper, and consequently the tribe was newly defined: Nowadays the tribe includes one extant genus only, namely *Meranoplus* (BOLTON 1995). One is here referred to BOLTON (1981) for further detailed information.

### Measurements and indices:

Measurements (in millimetres) and indices generally follow BOLTON (1981) for reasons of guaranteeing consistency, and to enable or simplify comparison. Two further indices, PML (promesonotal length) and PMI (promesonotal index) are introduced (only for workers).

TL	Total length. Length of out-stretched individual from mandibular apex to apex of gaster
HL	Head length. Length of head measured from mid-point of occipital margin to mid-point of anterior clypeal margin
HW	Width of head behind the eyes, measured in full face view
CI	Cephalic Index: $HW \times 100 / HL$
SL	Scape length. Length of antennal scape, excluding the basal condylar bulb
SI	Scape Index: $SL \times 100 / HW$
PML	Length of promesonotal shield, measured from anterior mid-point of pronotum behind collar, that is the mid-point of a virtual line, where the anterior pronotal margins meet, to mid-point of hind margin of mesonotum above propodeum
PW	Pronotal width, measured right behind base of antero-lateral pronotal projections (angles) in dorsal view (indicated by arrows). In <i>M. mucronatus</i> the shortest distance of promesonotal lateral margins is measured
PMI	$PW \times 100 / PML$
AL	Length of alitrunk, measured in lateral view from pronotal tooth to posterior base of metapleural lobe

### Abbreviations and Acknowledgements

The material used for the current study is deposited in the following institutions and private collections. Abbreviations, as far as available, follow ARNETT, SAMUELSON & NISHIDA (1993):

BMNH	The Natural History Museum, London, U.K. [= British Museum of Natural History] (B. Bolton)
CASC	California Academy of Sciences, San Francisco, U.S.A. (W. Pulawski, D. Ubick)
CASL	Coll. A. Schulz, Lechlingen, Germany
CRKB	Coll. R. Kohout, Brisbane, Australia
CSYK	Coll. S. Yamane, Kagoshima, Japan
MCSN	Museo Civico di Storia Naturale 'Giacomo Doria', Genoa, Italy (V. Raineri)
MCZC	Museum of Comparative Zoology, Cambridge, U.S.A. (S. Cover, M.S. Kelley)
MHNG	Muséum d'Histoire naturelle, Geneva, Switzerland (I. Löbl)
MNHN	Muséum National d'Histoire naturelle, Paris, France (J. Casevitz-Weulersse)
NHMB	Naturhistorisches Museum, Basle, Switzerland (M. Brancucci)
NHMW	Naturhistorisches Museum Wien, Vienna, Austria
OXUM	Hope Entomological Collections, University Museum, Oxford, U.K. (C. O'Toole)
UASK	Institute of Zoology of the Ukrainian National Academy of Sciences, Kiev, Ukraina (A. Radchenko)
USNM	Smithsonian Institution, Washington, U.S.A. (T.R. Schultz)
ZMHB	Zoologisches Museum der Alexander Humboldt Universität zu Berlin, Germany (F. Koch)

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### Catalogue and synonymic list of Oriental *Meranoplus*

*Meranoplus bellii* FOREL, 1902

= *M. carinatus* DONISTHORPE, 1942 (syn.n.)

= *M. flaviventris* DONISTHORPE, 1943 (syn.n.)

*Meranoplus bicolor* (GUÉRIN-MÉNEVILLE, 1844)

= *Myrmica tarda* JERDON, 1851

= *M. dimicans* WALKER, 1859

= *M. villosus* MOTSCHOUJSKY, 1860

= *M. bicolor* var. *lucidus* FOREL, 1903 (syn.n.)

= *M. bicolor* var. *fuscescens* W.M. WHEELER, 1930 (syn.n.)

*Meranoplus biliran* sp.n.

*Meranoplus boltoni* sp.n.

*Meranoplus borneensis* sp.n.

*Meranoplus castaneus* F. SMITH, 1857

= *M. cordatus* F. SMITH, 1857

= *M. castaneus* ssp. *hammaceros* FOREL, 1912 (syn.n.)

= *M. bellii* ssp. *javanus* KARAVAIEV, 1935 (syn.n.)

*Meranoplus laeviventris* EMERY, 1889

= *M. laeviventris* var. *punctulatus* EMERY, 1895 (syn.n.)

*Meranoplus levis* DONISTHORPE, 1942

*Meranoplus loebli* sp.n.

*Meranoplus malaysianus* sp.n.

*Meranoplus montanus* sp.n.

*Meranoplus nepalensis* sp.n.

*Meranoplus mucronatus* F. SMITH, 1857

*Meranoplus rothneyi* FOREL, 1902

I have here refrained from establishing distinct species-groups. Although related forms are easily recognizable and separated from others, the relations to species (or species-groups) occurring in other regions is not yet clear, and probaly would lead to an unnecessary increase of names and confusion. Furthermore, by far too little material from the remaining regions has been studied to the present.

However, grouping of related forms is possible. *Meranoplus castaneus* and *M. bellii* are separated from all their congeners by the shape of the promesonotal shield, the more oblique propodeum not, or only partly overhung by the posterior mesonotal margin and thus being a part of the dorsal alitrunk, in addition to five mandibular teeth and a bidentate petiole. Although these traits may be also found in the Ethiopian *M. spininodis*-group (BOLTON 1981), the larger size of the Oriental individuals and the construction of the entire promesonotal shield remain conspicuously different.

The closest relative of *Meranoplus levis* from Sri Lanka and southern India is *M. mayri*, FOREL, 1910, found on the island of Madagascar east of Africa. The two species have in common a roughly similar shape of the promesonotal shield and the surfaces of head and promesonotum being distinctly striate to carinulate. The latter trait separates the two species from all other Oriental and Ethiopian congeners, having the dorsal surfaces of head and promesonotum mostly distinctly rugulose-reticulate. This might astonish at first sight, but the circumstance is easily explained when taking into consideration that the



Fig. 1: Habitus of *Meranoplus mucronatus* F. SMITH

early ancestors of *Meranoplus* were of Gondwanian descent. Madagascar and India once were attached to each other, separating only in the late Cretaceous (84 mybp) (CRANSTON & NAUMANN 1970). No doubt, the two species constitute a separate species group.

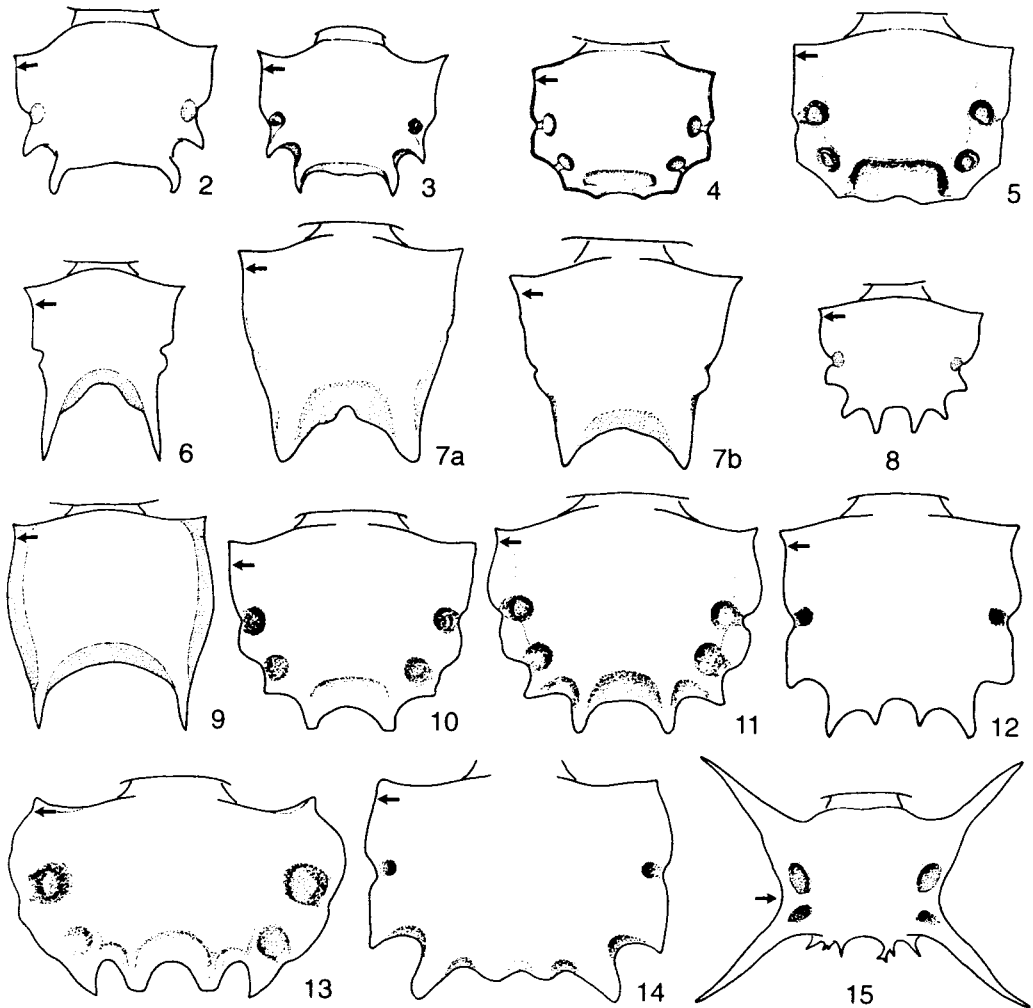
*Meranoplus mucronatus*, distinctive by the promesonotal armament, has its closest relatives in *M. rugifrons* and other allied species from New Guinea that show similar features. Together they all represent a species-group of their own. The remaining species are related to each other to a various extent (and to others from the Ethiopian and Australian regions) and separate into small groups. *Meranoplus bicolor*, *M. rothneyi*, and also some others of the smaller species match the *M. magrettii*-group, described from the Ethiopian Region (BOLTON 1981) very well. This species-group is overlapping the entire Old World tropics and Australia and has representatives in all relevant regions.

*Meranoplus laeviventris* with its conspicuously truncate petiolar dorsum does not seem to have any close relative in the region.

Key to workers of Oriental *Meranoplus*

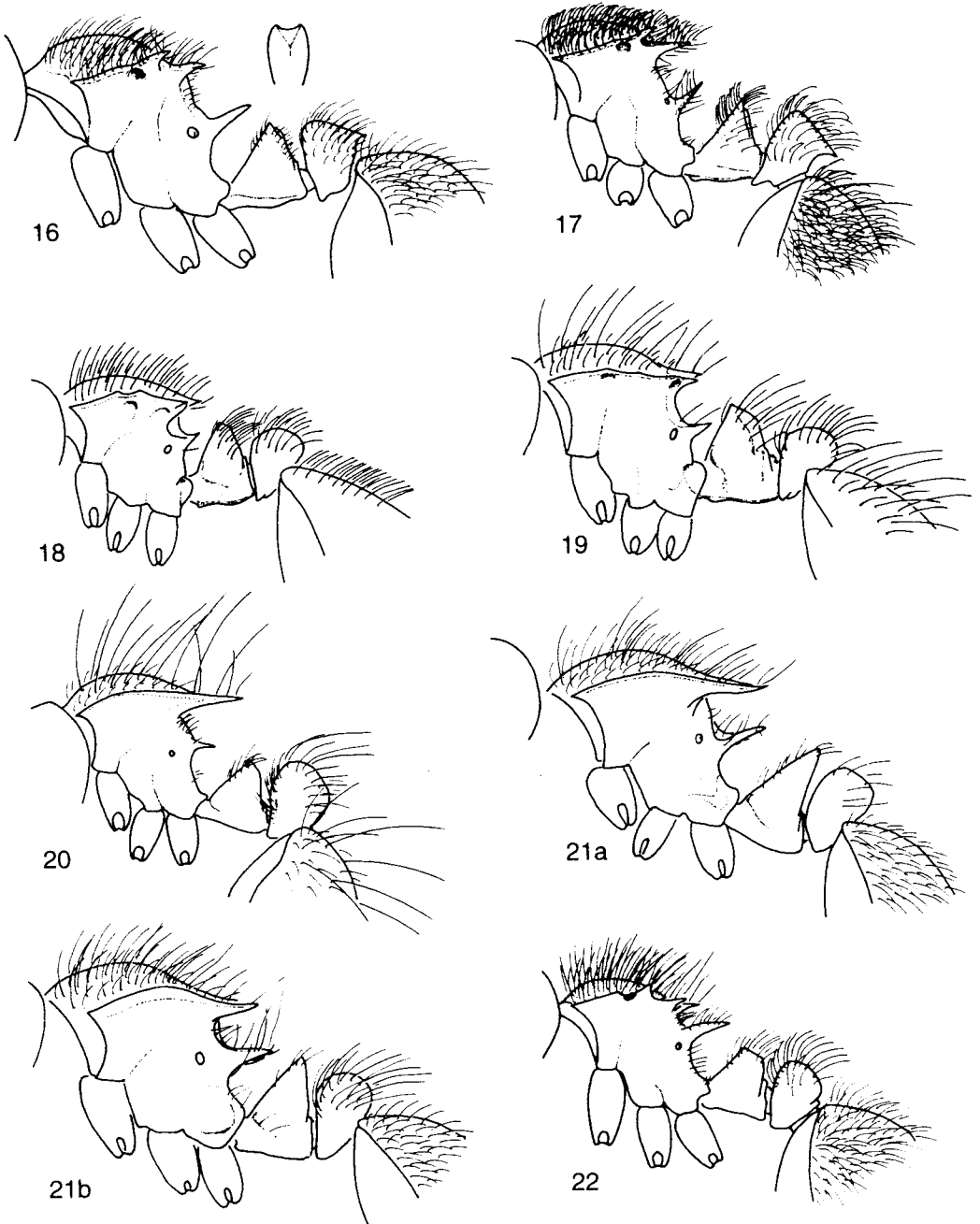
- 1 Petiolar crest distinctly bidentate, postpetiole with an acute, posteriorly directed short spine (Figs. 16, 17). Mandibles with five teeth. Posterior mesonotal margin not, or only slightly overhanging the propodeum, the latter constituting a part of the dorsal alitrunk ..... 2
- Petiole never bidentate and postpetiole never with a short spine dorsally. Mandibles with four teeth, sometimes with an additional basal offset denticle. Posterior mesonotal margin usually distinctly overhanging the propodeum, the latter meeting the dorsum of the alitrunk almost at a right angle ..... 3
- 2 Propodeum never overhung by the posterior mesonotal margin (Fig. 2). Suture between mesonotum and propodeum situated in the angle, where mesonotum and propodeum meet. Dorsal surface of first gastral tergite smooth and brilliant except for shagreened hair-pits. SW-India (Fig. 30) ..... *bellii*
- Propodeum slightly overhung by the posterior translucent margin of promesonotal shield (Fig. 3). Suture between mesonotum and propodeum below protruding mesonotal hind margin. Dorsal surface of first gastral tergite dull, entirely shagreened. Thailand, Malaysia (Fig. 32) ..... *castaneus*

- 3 Mandibles with five teeth, the basal tooth offset. Dorsal surfaces of head and promesonotum smooth, additionally distinctly carinulate. Southern India, Sri Lanka (Figs. 9, 23, 31) ..... *levis*
- Mandibles with four teeth. Dorsum of head and promesonotum always reticulate-rugulose ..... 4
- 4 Promesonotal shield armed with a very long, acute spine at each corner. (Figs. 1, 15, 29). Large species (HL 1.4 - 1.7, TL 5.8 - 7.1). Myanmar, ?Thailand, Malaysia, Indonesia (Fig. 31) ..... *mucronatus*
- Promesonotal shield without or with different armament, never with such long spines at the corners of the promesonotal shield. Distinctly smaller species (HL < 1.18, TL < 5) ..... 5
- 5 Promesonotal shield rectangular, lacking any armament (Figs. 4, 5). Small species (TL ≤ 3.0) ..... 6
- Promesonotal shield always with conspicuous, specific outstanding projections. Small to medium sized species (TL 3.0 - 4.5 mm) ..... 7
- 6 Petiole distinctly obliquely truncate. Dorsum of gaster distinctly shagreened. Pilosity consisting of short pubescence and longer outstanding hairs (Figs. 5, 19). Sabah, E-Malaysia (Fig. 30) ..... *borneensis*
- Petiolar crest only narrowly truncate. Dorsum of gaster either entirely smooth or occasionally with shagreening. Pilosity on dorsal surfaces consisting of a pelt of equal sized, short hairs (Figs. 4, 18). Malaysia, Indonesia (Fig. 32) ..... *malaysianus*
- 7 Promesonotum with only one pair of posteriorly directed mesonotal spines, without additional postero-lateral and/or posterior paramedian mesonotal projections. (Figs. 6, 7a, b) ..... 8
- Promesonotum of different shape, always with additional postero-lateral and/or posterior paramedian mesonotal projections ..... 9
- 8 Promesonotal shield with a single pair of posteriorly directed long spines in the posterior mesonotal corners. Dorsal surfaces and appendages provided with exceptionally long, outstanding hairs as well as shorter pubescence (Figs. 6, 20). Oriental (Fig. 30) ..... *bicolor*
- Promesonotal shield with a pair of posteriorly directed shorter, blunt or acute projections in the posterior mesonotal corners. Dorsal surfaces and appendages without extremely long hairs (Figs. 7a, b, 21a, b). India, Nepal, Bhutan (Fig. 31) ..... *rothneyi*
- 9 Outline of lateral margins of promesonotum convex in dorsal view; each margin with two large translucent fenestrae (Fig. 13); conspicuously wider than long, foliaceous (PMI 178 - 191). Sri Lanka (Fig. 32) ..... *loebli*
- Lateral margins of promesonotum in dorsal view not convex in outline, with lateral constrictions; margins never provided with four translucent fenestrae of that size; promesonotal shield less wide (PMI 134 - 155), rectangular or narrowed towards hind margin, never as foliaceous ..... 10
- 10 Alitrunk in dorsal view rectangular; lateral margins parallel-sided with a weak constriction at the level of lateral fenestrae (Figs. 12, 14) ..... 11
- Alitrunk in dorsal view not rectangular, lateral margins never parallel-sided, conspicuously narrowed towards hind margin, with distinct lateral constrictions at the level of lateral fenestrae (Figs. 8, 10, 11) ..... 12



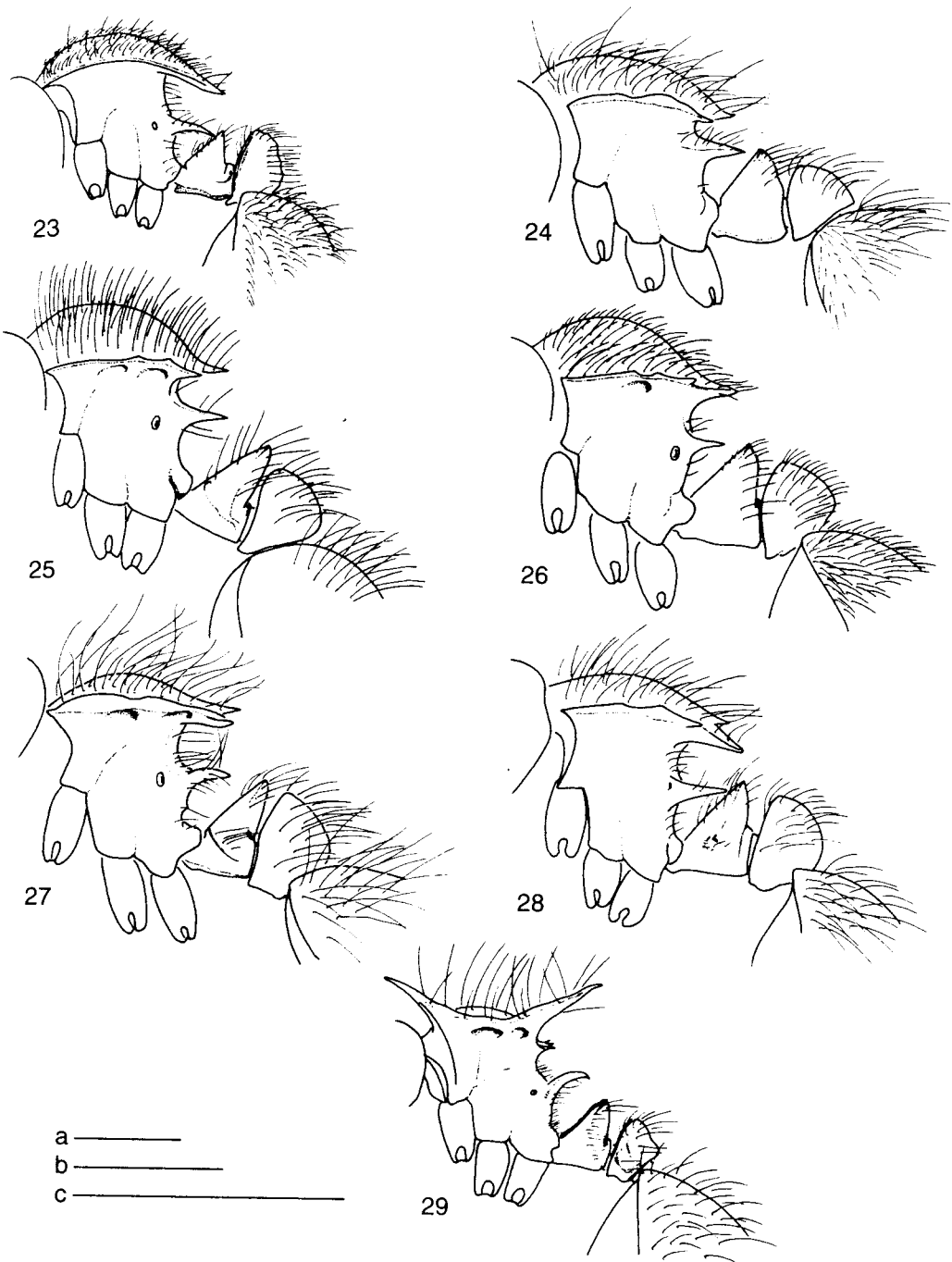
Figs. 2 - 15: Outline of promesonotal shield of *Meranoplus* workers (sculpture and pilosity omitted): (2) *bellii*, (3) *castaneus*, (4) *malaysianus*, (5) *borneensis*, (6) *bicolor*, (7a) *rothneyi* (paralectotype; Cochín), (7b) *rothneyi* (specimen from Meghalaya), (8) *laeviventris*, (9) *levis*, (10) *nepalensis*, (11) *boltoni*, (12) *montanus*, (13) *loebli*, (14) *biliran*, (15) *mucronatus*.

- 11 Hind margin of mesonotum sinuate, with blunt rounded projections, lacking distinct spines (Fig. 14). Anterior margin of clypeal mid-portion produced into a serrate apron. Philippines: Biliran Isl. (Fig. 31) ..... ***biliran***
- Hind margin of mesonotum with distinct acute paramedian spines (Fig. 12). Anterior margin of clypeal mid-portion produced into an entire, narrow apron. Borneo (Fig. 30) ..... ***montanus***
- 12 Petiole in profile distinctly truncate dorsally. Promesonotal shield with one pair of translucent fenestrae (Figs. 8, 22). Larger species (HL 0.98 - 1.07, TL 4.1 - 4.5). Myanmar, Thailand (Fig. 30) ..... ***laeviventris***



Figs. 16 - 22: Lateral view of midbody of *Meranoplus* workers: (16) *bellii*, (17) *castaneus*, (18) *malaysianus*, (19) *borneensis*, (20) *bicolor*, (21a) *rothneyi* (Paralectotype: Cochin), (21b) *rothneyi* (specimen from Meghalaya), (22) *laeviventris*.





Figs. 23 - 29: Lateral view of midbody of *Meranoplus* workers: (23) *levis*, (24) *nepalensis*, (25) *boltoni*, (26) *montanus*, (27) *loebli*, (28) *biliran*, (29) *mucronatus* (scales representing 1 mm. scale a: Figs. 15, 29; scale b: Figs. 2, 3, 6, 8, 9, 16, 17, 20, 22, 23; scale c: Figs. 4, 5, 7a, b, 10 - 14, 18, 19, 21a, b, 24 - 28).

- Petiole in profile cuneate dorsally. Promesonotal shield with two pairs of translucent fenestrae. Distinctly smaller species (HL 0.7 - 0.83, TL 3.0 - 3.4) ..... 13
- 13 Promesonotal shield with distinct spine-like postero-lateral and posterior projections (Figs. 11, 25). Anterior margin of clypeal mid-portion denticulate. Sri Lanka (Fig. 32) ..... *boltoni*
- Promesonotal shield with spine-like projections only posteriorly (Figs. 10, 24). Anterior margin of clypeal mid-portion produced into a narrow, medially excavated apron. Nepal (Fig. 31) ..... *nepalensis*

## Taxonomy

### *Meranoplus bellii* FOREL (Figs. 2, 16, 30)

*Meranoplus bellii* FOREL, 1902: 240 (worker). - BOLTON 1995: 250 (catalogue). **Seven syntype workers** were studied. One worker, "Typus \ M. Bellii ♂ Forel typus Kanara XXVI (Bell) ... \ Coll. A. Forel" (MHNG) is here designated as **lectotype**. **Paralectotypes**: 2 workers, together with the lectotype on the same pin with same data (MHNG); 1 worker, "M. Bellii Forel Kanara type (Bell) \ Sammlung Dr. F. Santschi Kairouan" (NHMB); 2 workers, "Cotypus \ M. Bellii ♂ Forel Kanara (Wroughton) LIII / 7 \ Coll. A. Forel" (MHNG); 1 worker, "Forel \ M. Bellii ♂ Forel Kanara Indien. \ Collect. G. Mayr \ Bellii Forel type" (NHMW). One ?syntype worker, "Kanara Bell \ Meranoplus bellii For. \ Paratypus \ Forel det 1922 [!sic] \ Zool. Mus. Berlin" (ZMHB).

*Meranoplus carinatus* DONISTHORPE, 1942: 456 (queen) (Malabar, India). - BOLTON 1995: 251 (catalogue). - **Holotype queen** (BMNH; examined): "Amarambalam Forest, 500-1,500', Malabar, S. India 20-IX-38 \ Holotype \ Type Meranoplus carinatus Donis H. Donisthorpe det. 10.III.42". Although no further females of *M. bellii* could be studied, the colouration, the excised petiole and the shape of the postpetiole leave no doubt as to the identity of the species. - (= **syn.n.**)

*Meranoplus flaviventris* DONISTHORPE, 1943: 202 (worker) ("Tenmalai", Kerala, India). - BOLTON 1995: 251 (catalogue). - **Holotype worker** (BMNH; examined): "Holotype \ Tenmalai, 500-800', Travancore [= Kerala], S. India, 11-17-X-38 [overleaf:] B.M.-C.M. Expdn. to S. India, Sept.-Oct., 1938 \ Type Meranoplus flaviventris Don. H. Donisthorpe det. 15.XII.42. \ B.M. TYPE HYM. 11.447". *Meranoplus flaviventris* resembles *M. bellii* in all structural respects. Differences lie in the external appearance (colouration) of the types of both taxa, namely fair in *M. bellii* (head brown, alitrunk light brown and gaster yellowish), whereas in *M. flaviventris* head and alitrunk are dark brown to black and the gaster is brownish. - (= **syn.n.**)

**Type locality:** Kanara, Karnataka, India.

**Additional material examined** (22 workers): "Bingham", no locality given (ZMHB) (3 ♂♂). **India:** Karnataka: Jog Falls [= Gersoppa Falls], 27.III.1982 (BMNH) (1 ♂). Kerala: Trichur Distr., Irinjalakuda, 2.V.1969, leg. Soans (MCZC) (12 ♂♂); Erumely, Kottayam Distr., 1000 ft., 27.IV.1969, leg. Soans (MCZC) (1 ♂); W Ghats, Kottiyoor, Wynaad Taluk, 650 m a.s.l., 7.IV.1969, leg. Soans & Brown (MCZC) (1 ♂); Penyar Sanctuary, Thekkady, 500 - 1000 m a.s.l., 2.-5.I.1997, leg. Schulz & Vock (CASL) (2 ♂♂). Maharashtra: Bombay (MCZC) (1 ♂); Periyar, 15.X.1979, leg. Noyes (BMNH) (1 ♂).

**Description** (worker): TL: 4.25 - 5.4, HL: 1.0 - 1.18, HW: 1.07 - 1.3, CI: 100 - 114, SL: 0.75 - 0.83, SI: 63 - 75, PML: 0.7 - 0.85, PW: 0.9 - 1.1, PMI: 126 - 140, AL: 1.05 - 1.25 (14 measured).

Mandibles striate, armed with five teeth, the basal tooth sometimes offset. Mid-portion of clypeus smooth, slightly concave, laterally striate. Frontal triangle unsculptured and shiny. Head above antennal scrobes trapezoid, lateral sides evenly narrowed from posterior corners towards clypeus; ventral part of head (below antennal scrobes) more

rectangular, considerably wider than dorsal part, and thus genae distinctly prominent and visible from above. Antennal scrobes almost reaching posterior corners of head, distinctly longitudinally carinulate anteriorly, transversally so at the rear, with an additional shagreening. Genae carinate to rugulose, posterior ventro-lateral corners of head reticulate. Compound eyes situated well behind middle of lateral sides of head, but not near posterior corners. Maximum diameter of eye 0.23 - 0.26, with 14 - 16 ommatidia in the longest row.

Promesonotum slightly wider than long, overhanging lateral sides of alitrunk. Propodeum and propodeal spines visible from above, never overhung by a posterior mesonotal projection. Anterior pronotal corners provided with stout antero-laterally projecting short spines or teeth. Promesonotal suture invisible, at its level laterally a small fenestra on each side of the shield near or at the lateral margin. Behind the fenestra with a posteriorly directed, stout tooth and one additional distinctly arcuate tooth of similar size at the posterior mesonotal corner, where it meets the propodeum. Declivity of propodeum carinulate in above (anterior) area, glossy below. In about middle of its length propodeum provided with two long slender and considerably diverging lateral spines. The suture between dorsal alitrunk and propodeum is situated in the angle where the posterior mesonotal margin meets the declivity.

Petiole in profile cuneate, distinctly tapered from base to crest and conspicuously bidentate when viewed from behind. Anterior petiolar face smooth, posterior face carinulate, with an inconspicuous Y-shaped median carina (Fig. 16, insert). Postpetiole nodiform in profile, its posterior face concave, with a dorsal, posteriorly directed acute tooth which overhangs the posterior face. First gastral tergite densely covered with pubescence, shiny and unsculptured, except for hair-pits which are surrounded by minute wrinkles.

Dorsum of head behind frontal triangle longitudinally carinulate with few transverse meshes, posteriorly densely reticulate, the meshes ca. 30 - 50  $\mu\text{m}$  wide; with dense, erect, apically arcuate hairs (ca. 100 - 150  $\mu\text{m}$ ). Promesonotal shield and postpetiole more strongly reticulate-rugulose above, the meshes ca. 50 - 70  $\mu\text{m}$  wide; with pubescence consisting of similar, although longer (ca. 150 - 220  $\mu\text{m}$ ) hairs. Only occasionally outstanding hairs surpass the layer of pubescence. Colour varying from a pale uniform brown to dark fuscous, frequently bicoloured, with the head, alitrunk, petiole and postpetiole of a dark brown, and the gaster ferruginous ("*flaviventris*").

**Differential diagnosis:** This species is unique in the Indian Subcontinent by the shape of the alitrunk, the propodeum not overhung by the promesonotal shield, and the shapes of both petiole and postpetiole. *Meranoplus castaneus*, the closest relative, is found from Thailand on southwards and eastwards to Borneo. It differs by the propodeum overhung by the hind margin of the promesonotal shield and the postpetiole in profile being considerably narrower than in *M. bellii*. Although the two species are well separated geographically, they have frequently been mixed up.

**Distribution** (Fig. 30): Found only in India.

***Meranoplus bicolor* (GUÉRIN-MÉNEVILLE) (Figs. 6, 20, 30)**

*Cryptocerus bicolor* GUÉRIN-MÉNEVILLE, 1844: 425 (worker). - F. SMITH 1853: 224. (combination in *Meranoplus*). F. SMITH 1875: 34 (queen, male). BOLTON, 1995: 250 (catalogue).

- The holotype worker could not be located; still the original description leaves no doubt as to the identity of the taxon.

*Myrmica tarda* JERDON, 1851: 115 (worker) (India). - EMERY 1892: 166 (synonym of *bicolor*), BOLTON 1995: 252 (catalogue). - The type material of *Myrmica tarda* JERDON has been destroyed or lost (Barry Bolton, personal communication). Therefore the synonymy established by EMERY (1892), is followed here.

*Meranoplus dimicans* WALKER, 1859: 375 (worker) (Sri Lanka). - BINGHAM 1903: 168 (? = *bicolor*), DONISTHORPE 1932: 576 (synonym of *bicolor*), BOLTON 1995: 251 (catalogue). - **Holotype worker** (BMNH; examined): "[round violet label] 63.52 [written on white back side] \ dimicans \ Holotype \ B.M. TYPE HYM. 11.841 \ dimicans Walker". The synonymy is here confirmed.

*Meranoplus villosus* MOTSCHOUJSKY, 1860: 115 (queen) (Sri Lanka). - ROGER 1863: 39 (synonym of *bicolor*), BOLTON 1995: 252 (catalogue). - The type(s) of *M. villosus* MOTSCHOUJSKY (? Museum of the Lomonosov University, Moscow) could not be studied. The synonymy given by ROGER (1863), is followed here.

*Meranoplus bicolor* var. *lucidus* FOREL 1903: 706 (worker) (Myanmar). - FOREL 1909: 224 (male), BOLTON 1995: 251 (catalogue). - **Three syntype workers** (MHNG), mounted together on the same pin, were studied, and the new synonymy is here established. **The top specimen is designated as lectotype**, the two remaining specimens are **paralectotypes**: "Typus \ Watson 1891 3. \ Watson Birma II/3 \ *M. bicolor* \ Guerin var *lucidus* \ Coll. A. Forel". Two male specimens (MHNG), also labelled "Typus" are not syntypes (FOREL, 1909; description of males). Syntypes from Calicut and Calcutta (see original description) could not be studied. - (= **syn.n.**)

*Meranoplus bicolor* var. *fuscescens* W.M. WHEELER, 1930: 101 (worker) (Taiwan). - BOLTON 1995: 251 (catalogue). **Lectotype worker** (MCZC), by **present designation**: "Pescadore Formosa Takahashi \ Wm. M. Wheeler \ M.C.Z. \ CoType I 22150 \ Syntype *Meranoplus bicolor* var. *fuscescens* Wheeler \ MCZ Museum of Comparative Zoology". Following the original description there is a second syntype worker, which was not studied. The synonymy is here established. - (= **syn.n.**)

## Type locality: Pondicherry, Tamil Nadu, India.

**Additional material examined** (586 workers, 10 queens, 7 males): **Pakistan**: 10 mls. SW Kohat, 650 m a.s.l., 19.XII.1961, leg. Ross & Cavagnaro (CASC) (1 ♂); Rawalpindi, 1674', 2.X.1977, leg. Hevel (USNM, NHMW) (4 ♀♀). **Sri Lanka**: "Ceylon" (NHMW, MNHN) (8 ♀♀), *ibid.*, leg. Escherich (NHMB) (3 ♀♀); Peradeniya (NHMW) (10 ♀♀), *ibid.*, 4.VII.1955, leg. Wilson (MCZC) (1 ♂), *ibid.*, leg. Escherich (NHMB) (1 ♂); Henaratgoda, 2./11.II.1902, leg. Uzel (MCZC, NHMW) (18 ♀♀); Colombo (NHMW) (1 ♂); Bandarawella, 15.I.1988, leg. Bolton (BMNH) (9 ♀♀); Colombo / Dehiwala, 7.VIII.1950, leg. Brown (CASC) (14 ♀♀); Colombo / Ratmalana, 6.I.1968, leg. Halstead (CASC) (1 ♂); Colombo / Laxapathiya, 9.IX.1958, leg. Perera (MCZC) (9 ♀♀); Colombo, 27.XII.1951, leg. Brown (MCZC) (3 ♀♀); Pollonaruwa / Madirigiriya, 20.III.1958, leg. Perera (MCZC) (12 ♀♀); Yakkala, 1959, leg. Perera (MCZC, USNM, NHMW) (15 ♀♀); Kandy, 600 - 700 m a.s.l., 10.-13.VII.1955, leg. Wilson (MCZC) (3 ♀♀); Laxapathiya / Moratuwa, 1960, leg. Perera (MCZC, USNM) (4 ♀♀); Maho, 1960, leg. Perera (MCZC) (1 ♂); Colombo / Udugalla, 7.II.1958, leg. Perera (MCZC) (8 ♀♀); Sawaragomuwa Prov., Opanyeka, 1959, leg. Perera (MCZC) (5 ♀♀); Ratnapura, 16.-20.VII.1955, leg. Wilson (MCZC) (2 ♀♀); Kantalai, 2.II.1970, leg. Mussard, Besuchrt & Löbl (NHMB, NHMW) (4 ♀♀); Uva, Wellawaya, 300 m a.s.l., 25.I.1970, leg. Mussard, Besuchrt & Löbl (NHMB) (1 ♂). **India**: "India", coll. King (MCZC) (6 ♀♀); "India" (USNM) (3 ♀♀). Goa Daman & Diu: Sakete Distr. Colva, 15.-18.I.1997, leg. Schulz & Vock (CASL) (2 ♀♀). Uttar Pradesh: Aligarh, 2.II.1979, leg. Noyes (BMNH); Rajaji NP, 10 km SE Dehra Dun, 10.X.1996, leg. Schulz & Vock (NHMW, CASL) (8 ♀♀, 1 ♂); Rajaji NP, 10 km NW Rishikesh, 11.X.1996, leg. Schulz & Vock (NHMW, CASL) (9 ♀♀). Rajasthan: "Gengi" [= Genji] (MNHN) (2 ♀♀). Maharashtra: Poona [= Pune], 1890 (USNM) (1 ♂). Bihar: Ranchi, 11./12.IX.1978, leg. Imai (NHMB) (4 ♀♀); 3 mls. NW Ranchi, 700 m a.s.l., 10.XI.1961, leg. Ross & Cavagnaro (CASC) (1 ♂). Tamil Nadu: Madras (MNHN) (3 ♀♀), *ibid.*, 5.I.1976, leg. Mathew (BMNH) (3 ♀♀); Tanjore [= Thanjavur], 27.IV.1937, leg. Nathan (CASC) (3 ♀♀); 10 mls. SW Guddiyattam, 350 m a.s.l., 4.III.1962, leg. Ross & Cavagnaro (CASC) (3 ♀♀); Yercaud, 4000 feet, 6.III.1962, leg. Ross & Cavagnaro (CASC) (1 ♂); Burliar, 650 m a.s.l., 10.III.1962, leg. Ross & Cavagnaro (CASC) (1 ♂); N Arcot, Walajanagar (MCZC) (12 ♀♀, 5 ♀♀), *ibid.*, leg. Nathan (USNM) (9 ♀♀, 1 ♂). West Bengal: Calcutta

(NHMW, BMNH) (4 ♀♀), *ibid.*, 23.IX.1978, leg. Imai (NHMB) (3 ♀♀); Darjiling, Kalimpong, 5.XI.1977 (NHMB) (3 ♀♀); Tezgaon, 1.VIII.1944, leg. DeHardy (USNM) (4 ♀♀). Orissa: "Orissa" (MNHN) (2 ♀♀); Chilka Lake, Barkuda Island [= Parikud Island], 23.VII./27.VIII.1923, leg. Wheeler (MCZC) (4 ♀♀, 1 ♂). Karnataka: Mysore (USNM) (2 ♀♀); Bangalore, 9.VI.1950, leg. Lawrence (CASC, USNM) (5 ♀♀); Mangalore, 1969, leg. Soans (MCZC) (3 ♀♀). Kerala: Kerala State, 1969, leg. Soans (MCZC) (4 ♀♀); Travancore (USNM) (1 ♀); Changanacherry, 30.IV.1969, leg. Soans (MCZC) (2 ♀♀); Calicut, V.-VI.1969, leg. Soans (MCZC) (1 ♀); Trichur Distr., Irinjalakuda, 2.V.1969, leg. Soans (MCZC) (4 ♀♀); Kottayam Distr., 1000 ft., 27.IV.1969, leg. Soans (MCZC) (2 ♀♀). Punjab: Chandigarh, 6.VIII.1978, leg. Imai (NHMB) (4 ♀♀). Delhi: Delhi, 2.IX.1978, leg. Imai (NHMB) (3 ♀♀). Assam: Kaziranga, 75 m a.s.l., 7.-9.V.1976, leg. Wittmer & Baroni Urbani (NHMB) (1 ♀). **Nepal:** Kathmandu, 1350 m a.s.l., 23.IX.1983, leg. Allen (BMNH) (2 ♀♀); 9 mls. W Hitaura, 400 m a.s.l., 23.XI.1961, leg. Ross & Cavagnaro (CASC) (2 ♀♀); Therai, Hitaura, 9.X.1972, leg. Franz (NHMB) (1 ♀); Therai, Amlekhgani, 7.-10.X.1972, leg. Franz (NHMB) (1 ♀); Goropani, W Pokhara (NHMB) (1 ♀). **Bhutan:** Samchi, 300 m a.s.l., 7.-11.V.1972, leg. Basel Bhutan exp. NHMB (NHMB) (1 ♀). **Myanmar** [= Burma]: Bhamò, VI.1885, 1886, leg. Fea (NHMW, MNHN, USNM) (8 ♀♀); Rangoon, V.1885, leg. Fea (NHMW, MNHN, BMNH, USNM) (10 ♀♀), *ibid.*, leg. Gates (MCZC) (4 ♀♀); Mandalay, 1885, leg. Fea (NHMW) (1 ♀), *ibid.*, 29.IX.1975, leg. Myaing (BMNH) (6 ♀♀). **Thailand:** Krabi, Noppharat Thara, 25.-28.III.1993, leg. Madl (NHMW) (3 ♀♀); Krabi, Ao Nang, 16.III.-4.IV.1993, leg. Madl (NHMW) (7 ♀♀); Chiang Mai (USNM) (2 ♀♀); Chiang Mai, Doi Suthep, 305 m a.s.l., 17.VII.1970, leg. Tobler (CASC) (30 ♀♀); Mae Chiang Hai, 200 m a.s.l., 13.VII.1962, leg. Ross & Cavagnaro (CASC) (6 ♀♀); Banpe, 13 mls. E Rayong, 31.VII.1962, leg. Ross & Cavagnaro (CASC) (16 ♀♀); Central Thailand, Sakae Rat Forest, 19.VIII.1992, leg. Furth (MCZC) (3 ♀♀); Chiang Mai Prov., Doi Inthanon NP, 16.VIII.1992, leg. Furth (MCZC) (6 ♀♀); Phang Nga Prov., Khao Lak, 19.I.1995, leg. Schulz & Vock (NHMW, CASL) (3 ♀♀); Nakhon Si Thammarat, Ban Nai Plao, 10 km S Khanom, 7.I.1996, leg. Schulz & Vock (CASL) (5 ♀♀); Ratburi, Bangpongmoeng, 29.VI.1952, leg. Elbel (USNM) (1 ♀); Ratburi, Bankpong Pakrat, 3.VII.1952, leg. Elbel (USNM) (1 ♀); Korat [= Nakhon Ratchasima], 22.VIII.1952, leg. Elbel (USNM) (4 ♀♀); Korat Sikiu Pakchong, 23.VIII.1952, leg. Elbel (USNM) (5 ♀♀, 1 ♂). **Vietnam:** Saigon, 20.II.1949, leg. Barbier (MNHN) (7 ♀♀), *ibid.*, 1.1961, leg. Crozier (MCZC) (6 ♀♀). **China:** Guangdong: Ding-Hu Mts., 60 km W Guangzhou, VI.1983, leg. Boucek (BMNH) (3 ♀♀). Jiangxi: "SE Kiangsi", 27.VI.1936, leg. Gressitt (CASC) (1 ♀). Fujien: Foochow [= Fuzhou], 3.VIII.1934, leg. Gressitt (MCZC) (1 ♀). Hainan: Kiungchow, 27.V.1935, leg. Gressitt (MCZC) (1 ♀); Hong Kong: "Hong Kong", leg. Terry (MCZC) (1 ♀); Kowloon, leg. Silvestri (MCZC) (1 ♀); Taipo, leg. Silvestri (MCZC) (3 ♀♀). **Malaysia:** Perak: 2 mls. E Gopeng, 100 m a.s.l., 21.VI.1962, leg. Ross & Cavagnaro (CASC) (1 ♀). Selangor: Kuala Lumpur, 6.VII.1962, leg. Ross & Cavagnaro (CASC) (3 ♀♀), *ibid.*, 15.X.1973, leg. Bolton (BMNH, NHMB) (7 ♀♀), *ibid.*, III.-IV.1989, leg. Way (BMNH) (1 ♀); 14 km NW Kuala Lumpur, nr. Batu Caves, 2.VIII.1983, leg. Hevel & Steiner (USNM) (5 ♀♀); Penchala nr. Kuala Lumpur, 8.IX.1969, leg. Pilet (MHNG) (1 ♀); Lentang Forest, 28.VIII.1992, leg. Furth (MCZC) (1 ♀); Kepong, VIII.1949, Army Scrub Typhus Unit (USNM) (7 ♀♀). Johor: Sedikit Kecil, Kota Tinggi, 10.-13.VI.1969, leg. Pilet (MHNG) (3 ♀♀). Pahang: Fraser Hill, 1400 m a.s.l., 12.VIII.1969, leg. Pilet (MHNG) (1 ♀). **Singapore:** "Singapore", Coll. Baker (MCZC, USNM) (2 ♀♀). **Indonesia:** "Java" (MNHN) (3 ♀♀), *ibid.*, leg. Duchossoy (NHMB) (1 ♀); Batavia [= Jakarta] (1 ♀); Borobudur, 8./25.XI.1978, leg. Huber (MHNG, NHMW) (8 ♀♀); Java, Bogor, leg. Hamann (NHMW) (20 ♀♀); E-Java, Gradjagan, 3.XII.1956, leg. Hamann (OLL) (3 ♀♀); Bogor, 31.VIII./12.X.1956, 28.IV.1957 (OLL) (39 ♀♀), *ibid.*, Gunung Gedé, 12.X.1956 (OLL) (10 ♀♀), *ibid.*, bot. garden, 28.X./4.XI.1955 (7 ♀♀), *ibid.*, Dj. Tjikuraj, 10.V.1959 (35 ♀♀), *ibid.*, Kedung, 2.III.1956 (1 ♀), all leg. Hamann (OLL); South coast, Tjibadak [= Cibadak], 23.VI.1957, leg. Hamann (OLL) (3 ♀♀); Ujung Kulon, 28.VI.1959, leg. Hamann (OLL) (1 ♀); Semarang, 15.X.1927, leg. Kalshoven (MCZC) (7 ♀♀, 1 ♂, 7♂♂).

**Description** (worker): TL: 3.7 - 4.5, HL: 0.76 - 0.93, HW: 0.85 - 1.05, CI: 89 - 103, SL: 0.65 - 0.75, SI: 75 - 82, PML: 0.55 - 0.82, PW: 0.7 - 1.0, PMI: 116 - 136, AL: 0.8 - 1.13 (16 measured).

Mandibles striate, armed with four teeth. Mid-portion of clypeus carinulate, at least with a few carinulae; anterior clypeal margin produced into a narrow and concave translucent lamella which is produced into small denticles in the antero-lateral corners. Frontal triangle shiny, with few carinulae posteriorly. Head above antennal scrobes trapezoid, lateral sides evenly narrowed towards clypeus; ventral part of head (below antennal scrobes)

distinctly wider, parallel-sided, the genae distinctly protruding and visible from above. Antennal scrobes posteriorly shagreened, occasionally with additional transverse carinulae or rugae. Genae rugulose. Compound eyes situated in posterior half of sides of head close to posterior corners. Maximum diameter of eye 0.2 - 0.26, with 11 - 14 ommatidia in the longest row.

Promesonotum slightly wider than long, laterally margined and slightly overhanging alitrunk. Declivity of propodeum almost invisible from above, overhung by posterior margin of promesonotal shield (the propodeal spines are visible though). Anterior pronotal corners produced into acute, laterally projecting teeth. At about level of (not visible) promesonotal suture the shield constricted by a lateral indentation which is followed by a short lateral denticle and a large, posteriorly directed straight spine on each side, which may vary considerably in length. In specimens from Sri Lanka the posterior spines occasionally are conspicuously diverging ("*dimicans*"). Posterior margin of the mesonotum a translucent lamella between the posterior spines, overhanging the propodeum. Propodeal declivity meeting dorsum of alitrunk almost at a right angle. Propodeum shiny throughout, with occasional transverse rugae above or at level of the slender and acute, only little diverging lateral spines. The suture between dorsal alitrunk and propodeum is very well visible beneath posterior mesonotal margin on the propodeal declivity, when viewed from behind.

Petiole in profile cuneate, when viewed from behind, highest in middle, occasionally the crest acute. Both anterior and posterior faces of petiole unsculptured. Postpetiole nodiform, strongly rugulose throughout. Gaster densely shagreened, sometimes partly glossy ("*lucidus*").

Dorsum of head longitudinally carinulate to rugulose anteriorly, occipital region with a reticulum, width of meshes ca. 50 - 70  $\mu\text{m}$ . Secondly the meshes with a distinct shagreening. Promesonotal shield and postpetiole strongly reticulate-rugulose, width of meshes ca. 50 - 80  $\mu\text{m}$ , without secondary shagreening. All dorsal surfaces with a shorter suberect, scattered pilosity (ca. 100 - 170  $\mu\text{m}$ ) and fewer, extraordinary long, outstanding erect setae (0.3 - 0.6 mm). Femora and tibiae with numerous long, outstanding hairs as well. Populations from different samples vary noticeably in the hair length. Body mostly bicoloured, with head, alitrunk, petiole and postpetiole of a pale to darker ferrugineous and the gaster piceous. Sometimes appearance of entire body uniformly dark.

**Differential diagnosis:** *Meranoplus bicolor* is the most common species in the Oriental Region. It is hardly to be confused with any other congener within the range of its occurrence. It is distinct by the long posteriorly directed spines and the unique pilosity, which are found in no other species.

**Distribution** (Fig. 30): Pakistan, Nepal, Bhutan, India, Sri Lanka, Myanmar, Thailand, Vietnam, China, Malaysia, Indonesia.

### *Meranoplus biliran* sp.n. (Figs. 14, 28, 31)

**Type locality:** Biliran Island, Philippines.

**Type material:** **Holotype worker.** "Biliran Is PI \ CF Baker collection 1927" (USNM); **paratypes:** 8 workers: "Isl. Biliran Philippines Baker" (USNM, NHMW, BMNH, MCZC).

**Description:** Holotype worker: TL: 3.25, HL: 0.85, HW: 0.88, CI: 104, SL: 0.63, SI: 72, PML: 0.73, PW: 1.1, PMI: 152, AL: 0.83.

Paratype workers: TL: 3.0 - 3.38, HL: 0.83 - 0.88, HW: 0.85 - 0.9, CI: 100 - 106, SL: 0.63 - 0.65, SI: 71 - 76, PML: 0.7 - 0.75, PW: 1.1 - 1.13, PMI: 147 - 155, AL: 0.83 - 0.88 (7 measured).

Mandibles striate, armed with four teeth. Mid-portion of clypeus distinctly rugulose-reticulate; anterior clypeal margin rather serrate than provided with a row of denticles. Frontal triangle reduced to a narrow, striate, arcuate furrow between posterior clypeal margin and anterior frontal margin. Sometimes a small triangle may be visible. Head above the antennal scrobes rectangular; posterior 4/5 almost parallel-sided, sides of head only anteriorly narrowed towards clypeus. Head ventrally to the antennal scrobes of similar shape, genae not protruding below the distinctly overhung antennal scrobes. Antennal scrobes shagreened throughout and posteriorly transversally striate, anterior-most glossy. Genae reticulate-rugulose. Compound eyes situated well behind middle of lateral sides of head. Maximum diameter of eye 0.17 - 0.19, with 14 - 15 ommatidia in the longest row.

Promesonotum rectangular, distinctly wider than long. Lateral margins of the promesonotal shield foliaceous, distinctly overhanging sides of alitrunk; propodeum overhung by hind margin of mesonotum. Anterior corners of pronotum acutely retangular; the sides of the shield somewhat parallel-sided, sinuate and slightly constricted at about the level of the (invisible) promesonotal suture; at the same level with a small translucent fenestra on each side. Lateral mesonotal margins produced into acute, stout, posteriorly directed projections. Posterior corners of mesonotum with a blunt, stout spine on each side, pointing in a ca. 45° angle from the shield. Posterior margin of mesonotum sinuate, with paramedian blunt teeth. Lateral margins partly lamellate and translucent in that area. Declivity of propodeum shiny, with a faint shagreening, lateral sides above somewhat reticulate; lateral, acute propodeal spines situated at about middle of propodeal length. A suture between dorsal alitrunk and propodeum is apparent on the declivity beneath posterior mesonotal margin, when viewed from behind.

Petiole tapered from base to crest, its anterior face without structure, the posterior face carinulate. Postpetiole nodiform. Gaster dull, entire dorsum of first gastral tergite (and remainder of gaster) shagreened, if examined with higher magnification seen as a minute reticulum.

Dorsum of head, promesonotum and postpetiole evenly and rather densely reticulate-rugulose, width of meshes ca. 50 - 80 µm. Dorsal surfaces and appendages covered with whitish, stiff, erect (head) to suberect (alitrunk and gaster) pubescence. Pilosity consisting of shorter (ca. 150 - 200 µm) hairs, and longer, surpassing hairs (ca. 300 - 400 µm). Colour uniformly dark brown to piceous; translucent areas on sides of promesonotal shield brighter.

Antennal scapes and tibiae markedly striate.

**Differential diagnosis:** This easternmost species in the treated area is different from all other congeners by the very distinct shape of the dorsal alitrunk (Fig. 14) in addition to the micro-sculpturation of the gastral surface.

**Distribution** (Fig. 31): So far only known from the type locality.

**Derivatio nominis:** Named after the island of its origin.

***Meranoplus boltoni* sp.n.** (Figs. 11, 25, 32)

**Type locality:** Diyatalawa, southern Sri Lanka.

**Type material:** **Holotype worker**, "SRI LANKA Diyatalawa 15.i.88; 1680 m B.Bolton \[overleaf:] 38. on ground" (BMNH); **paratypes**: two workers, same data as holotype (BMNH, NHMW).

**Description:** Holotype worker: TL: 3.00, HL: 0.8, HW: 0.78, CI: 98, SL: 0.58, SI: 74, PML: 0.65, PW: 0.85, PMI: 131, AL: 0.75.

Paratype workers: TL: 3.13, HL: 0.83, HW: 0.78, CI: 94, SL: 0.58, SI: 74, PML: 0.63 - 0.65, PW: 0.83 - 0.85, PMI: 130 - 132, AL: 0.75 (2 measured).

Mandibles striate, armed with four teeth. Mid-portion of clypeus rugulosely-striate, only feebly concave. Anterior margin of clypeal mid-portion produced into a narrow shelf with a row of blunt denticles. Frontal triangle reduced to an arcuate furrow between clypeus and frons. Head above antennal scrobes rectangular, posteriorly parallel-sided, towards clypeus lateral sides of head evenly narrowed. Ventrally to the antennal scrobes head similarly shaped, thus genae not protruding and hardly visible from above. Antennal scrobes anteriorly smooth with few wrinkles or rugae, posteriorly with distinct transverse rugulae. Genae rugulose-reticulate. Compound eyes situated behind middle of lateral sides of head close to the posterior corners. Maximum diameter of eye 0.16 - 0.17, with 9 - 10 ommatidia in the longest row.

Promesonotum wider than long, the promesonotal shield distinctly margined, lamellate and overhanging sides of alitrunk laterally and propodeum posteriorly. Anterior corners of pronotum each with an acute tooth, posteriorly the sides of the shield distinctly sinuate and constricted at about the level of (invisible) promesonotal suture. Posterior corners of promesonotal shield provided with a short, acute spine on each side, pointing in a ca. 45° angle from the shield. Hind margin of mesonotum with paramedian short, blunt spines, between them a translucent lamella. Lateral margins of the shield with a translucent fenestra at level of promesonotal suture and a second one in front of posterior corners. Declivity of propodeum smooth throughout, with a faint shagreening especially above, the lateral sides acutely bordered. Lateral propodeal spines situated rather high above middle of propodeal length. Only lateral parts of suture between dorsal alitrunk and propodeum visible immediately below posterior margin of posterior mesonotal margin, when viewed from behind.

Petiole in profile tapered, its anterior face unsculptured. When viewed from above, posterior petiolar face behind the summit with a narrow transverse band of wrinkles, its declivity glossy. Postpetiole nodiform. First gastral tergite brilliant, especially laterally with a faint shagreening, and with a minute sculpturing around hair-pits.

Dorsum of head, promesonotum and postpetiole densely reticulate-rugulose, width of the meshes ca. 30 - 50(70) µm. Entire dorsal surface and appendages covered with dense, whitish, stiff, erect to suberect pubescence (ca. 250 - 300 µm). Colour of individuals uniformly brown.

**Differential diagnosis:** This species is close to *M. nepalensis*, but is different by the shapes of the anterior margin of the clypeus, the narrower petiole and the shape of the promesonotal shield (compare Figs. 10, 11).

**Distribution** (Fig. 32): So far known only from the type locality.



**Derivatio nominis:** Named for Barry Bolton (BMNH), who collected this species. In addition he provided the author with numerous material, and was especially helpful in many ways.

*Meranoplus borneensis* sp.n. (Figs. 5, 19, 30)

**Type locality:** Crocker Range National Park, Sabah, E-Malaysia.

**Type material:** **Holotype worker**, "SABAH Crocker RG. NP KK-Tambunan \ 60 km. 17.V.87 Burckhardt + Löbl. 1270 m [overleaf:] 29a" (MHNG); **17 paratype workers**, same locality data (MHNG, BMNH, NHMW); **1 paratype worker**, "SABAH: 1600 m. Crocker Range K.K.-Tambunan 18.V.87 Löbl + Burckhardt [overleaf:] 30" (MHNG).

**Description:** Holotype worker: TL: 3.0, HL: 0.75, HW: 0.75, CI: 100, SL: 0.48, SI: 64, PML: 0.55, PW: 0.7, PMI: 127, AL: 0.6.

Paratype workers: TL: 2.55 - 3.0, HL: 0.63 - 0.75, HW: 0.68 - 0.75, CI: 100 - 107, SL: 0.45 - 0.5, SI: 63 - 69, PML: 0.53 - 0.58, PW: 0.63 - 0.75, PMI: 125 - 136, AL: 0.58 - 0.65 (13 measured).

Mandibles striate, armed with four teeth. Mid-portion of clypeus vertical, roughly reticulate-rugulose, only feebly concave; anterior clypeal margin produced into a narrow lamellate apron. Frontal triangle reduced to an arcuate glossy furrow with occasional rugae. Head above antennal scrobes rectangular, posteriorly parallel-sided, anteriorly sides of head narrowed towards clypeus. Posterior corners of head acutely angulate. Ventrally to the antennal scrobes head similarly shaped, thus genae not protruding, hardly visible when viewed from above. Frons on each side of posterior boarder of clypeus above antennal sockets with a hyaline, translucent fenestra. Genae rugulose-reticulate, antennal scrobes anteriorly without sculpture, posteriorly above eyes with transverse costulae. Compound eyes situated only slightly behind middle of lateral sides of head. Maximum diameter of eye 0.16 - 0.18, with 8 - 10 ommatidia in the longest row.

Promesonotum rectangular, wider than long, the promesonotal shield laterally distinctly margined and overhanging sides of alitrunk. Sides of promesonotal shield without any acute projections or spines, roughly crenulate. Anterior corners of pronotum acutely angled, almost rectangular. Lateral sides of pronotum parallel, at about level of (invisible) promesonotal suture the shield slightly constricted and with a transparent fenestra on each side. Mesonotum anteriorly parallel-sided as well, posteriorly angled and converging with a concavity. At level of the concavity near lateral sides with a second equal sized or slightly smaller fenestra. Hind margin of mesonotum undulated, medially with a wide transverse translucent area which overhangs the propodeum posteriorly. Declivity of propodeum glossy throughout, meeting the dorsum of alitrunk almost in a right angle. No suture between dorsum of alitrunk and propodeum is visible below the posterior mesonotal margin, when viewed from behind. Propodeal spines acute, short, situated at middle of length of propodeum.

Petiole in lateral view distinctly obliquely truncate, its anterior face shiny, the dorsum and lateral sides rugulose, the posterior face shining with a few rugae. Postpetiole nodiform, reticulate-rugulose. First gastral tergite entirely densely shagreened, when examined with higher magnification seen as a minute reticulum.

Frons anteriorly rugose, remainder dorsum of head and promesonotum densely reticulate-rugulose; mesonotum near posterior margin with few rugae. Width of meshes on head ca. 30 - 50  $\mu\text{m}$  on dorsal alitrunk ca. (30)40 - 70  $\mu\text{m}$ . Entire dorsal surface covered with a layer of whitish, rather stiff, erect to suberect pubescence of ca. 80 - 120  $\mu\text{m}$  long hairs; the pubescence is surpassed by considerably longer, outstanding hairs (ca. 200 - 250  $\mu\text{m}$ ). Colour uniformly pale to dark brown, dorsum of head somewhat brighter.

**Differential diagnosis:** Among the smaller species *Meranoplus borneensis* is distinct by the shape of both the promesonotal shield, the petiole, and in addition the structure of the gaster. From *M. malaysianus*, with which it shares the unarmed shield, it differs in profile by the broader petiole, the shagreened gaster and by the secondary pilosity.

**Distribution** (Fig. 30): Known only from the type locality.

**Derivatio nominis:** At least one species in the genus should be named after the largest island in the Malay archipelago, Borneo.

### *Meranoplus castaneus* F. SMITH (Figs. 3, 17, 32)

*Meranoplus castaneus* F. SMITH, 1857: 81, pl. 2, fig. 7 (queen). - FOREL 1910: 29 (worker, Sumatra), BOLTON 1995: 251 (catalogue). - **Holotype queen** (OXUM; examined): "SAR. 6 \ castaneus Sm \ ♀ Meranoplus castaneus Smith, TYPE. J.P.L.S.Lond. v.ii,1858,p.42. \ Ann.Mag.Nat.Hist. vol.x,pp.441-476, 1932. \ Meranoplus castaneus Smith H.St.J.Donisthorpe det. 9.V.1932 ♀ \ Holotype \ TYPE HYM : 1038 Meranoplus castaneus SMITH HOPE DEPT. OXFORD".

*Meranoplus cordatus* F. SMITH, 1857: 82, pl. 2, fig. 5 (worker) (Sarawak, Borneo). - FOREL, 1912: 61 (synonym of *castaneus*), BOLTON, 1995: 251 (catalogue). - **Holotype worker** (OXUM; examined): "SAR 3 \ cordatus Sm. \ ♀ Meranoplus cordatus Smith, TYPE. J.P.L.S.Lond.v.ii,1858,p.42. \ Ann.Mag.Nat.Hist. vol.x,pp.441-476, 1932. \ Meranoplus cordatus Smith H.St.J.Donisthorpe det. 9.V.1932 \ Holotype \ TYPE HYM : 1039 Meranoplus cordatus SMITH HOPE DEPT. OXFORD". The synonymy with *M. castaneus*, established by FOREL (1912), and already supposed by Smith himself in the original description ("This is probably the worker of *M. castaneus*") is here confirmed.

*Meranoplus castaneus* ssp. *hammaceros* FOREL, 1912: 60 (worker) (Indrapura [= Siak Sri Inderapura], Sumatra, Indonesia). - BOLTON 1995: 251 (catalogue). - **Lectotype worker** (MHNG), **by present designation**: "Typus \ Indrapura Sumatra (Tritschler) \ *M. castaneus* Smith r. *hammaceros* ♀ type Forel \ Coll. A. Forel". **Paralectotypes**: two workers, mounted together with the lectotype on the same pin (MHNG); 1 worker, same data (NHMB). The synonymy with *M. castaneus* is here established. Further specimens, "*Sumatra* (Moesch)", as indicated in the original description, could not be studied. - (= **syn.n.**)

*Meranoplus bellii* ssp. *javanus* KARAVAEV, 1935: 98, fig. 22 (worker.) (Tjampea / Buitenzorg [= Bogor], W-Java, Indonesia). - BOLTON 1995: 251 (catalogue). - **Holotype worker** (UASK; examined): "bellii \ Tjampea b. Buitenzorg Karavaev \ 2390. Coll. Karavaevi \ Meranoplus bellii ssp. javana Kar. typ. \ Holotypus ♀ Meranoplus bellii javanus Karaw.". The synonymy with *M. castaneus* SMITH is here established. - (= **syn.n.**)

**Type locality:** Sarawak, Borneo, E-Malaysia.

**Additional material examined** (75 workers): **Thailand:** Nakhon Si Thammarat, Phromm Lok Waterfall, 25 km NW Nakhon. 100 - 300 m a.s.l., 8.I.1996, leg. Schulz & Vock (NHMW, CASL) (6 ♂♂). **Malaysia:** Selangor: 16 mls NE Kuala Lumpur, 1000', 8.VI.1962, leg. Ross & Cavagnaro (CASC) (1 ♀); Gombak, 2.X.1973, leg. Bolton (NHMB) (2 ♂♂). Negeri Sembilan: Pasoh, Pasoh Forest Res., 1.1994, leg. Brendell, Jackson & Lewis (BMNH) (3 ♂♂); Sungei Menyala For. Res., 2.III.1981, leg. Brown & Tho Yow Pong (MCZC) (1 ♀). Sabah: Danum Valley, XI.1986, leg. Eggleton (BMNH) (4 ♂♂). Sarawak: Gunung Mulu NP, 7.X.1977, leg. Bolton (BMNH) (1 ♀); Laban, Borneo [= ? Labang, Sarawak], leg. Mjöberg (MCZC) (1 ♀).

**Indonesia:** Sumatra: "Sumatra" (ZMHB) (1 ♂, ?syntype); Pematang Siantar, 1937, NGS SI Exp., leg. Mann (USNM, NHMW) (18 ♂♂); Bankinang, 1937, NGS SI Exp., leg. Mann (USNM) (1 ♂). Borneo (Kalimantan): 31 km N Balikpapan, 21.VI.1972, leg. Brown (MCZC) (7 ♂♂); 46 km W Batulitjin [= Batulicin], 28.VI.-2.VII.1972, leg. Brown (MCZC) (7 ♂♂); ITCI Timber camp, Balikpapan, IX.1975, leg. Johnson (MCZC) (4 ♂♂). **Brunei:** Kuala Belalong Field Studies Centre, 04°32'N 115°09'E, 21.-29.VI.1994, leg. Kohout (CRKB, NHMW) (10 ♂♂); Batu Apoi For. Res., 04°33'N 115°09'E, V.1995, leg. Gullan (CRKB, NHMW) (2 ♂♂); Bukit Sulang, nr. Lamunin, 20.VIII.-10.IX.1982, leg. Stork (BMNH) (6 ♂♂).

Malaysia, Indonesia or Brunei: "L. Navang, Borneo", leg. Mjöberg (MCZC) (13 ♂♂).

**Description** (worker): TL: 4.5 - 5.1, HL: 0.98 - 1.14, HW: 1.05 - 1.18, CI: 100 - 112, SL: 0.75 - 0.83, SI: 65 - 73, PML: 0.76 - 0.94, PW: 1.03 - 1.2, PMI: 125 - 135, AL: 1.13 - 1.25 (10 measured).

Mandibles striate, armed with five teeth, the basal tooth occasionally reduced to a denticle. Mid-portion of clypeus feebly concave, partly carinulate, anterior margin of clypeus entire. Frontal triangle apparent, glossy, with a faint shagreening. Head above antennal scrobes trapezoid, evenly narrowed towards clypeus; ventral part of head (below antennal scrobes) wider, more rectangular, thus genae distinctly prominent and visible from above. Antennal scrobes shagreened, with longitudinal and transverse carinulae. Genae rugulose. Compound eyes situated well behind middle of lateral sides of head, but not close to posterior corners. Maximum diameter of eye 0.25 - 0.28, with 16 - 17 ommatidia in the longest row.

Promesonotum slightly wider than long, overhanging sides of alitrunk laterally; propodeum overhung by a sinuate, translucent lamella, which is situated between the posterior teeth of the promesonotal shield. Anterior pronotal corners provided with stout antero-laterally projecting teeth. Promesonotal suture sometimes inconspicuously discernible, at its level small, translucent, lateral fenestrae on each side of the shield near or at the lateral margins. Behind the fenestra with a posteriorly directed, stout tooth and one additional arcuate tooth at the postero-lateral corner of the mesonotum. Declivity of propodeum glabrous throughout, with occasional longitudinal striae. In about middle of its length propodeum provided with two slender, only little diverging, lateral spines. An arcuate suture between dorsum of alitrunk and propodeum is visible right below the posterior mesonotal margin, when viewed from behind.

Petiole in lateral view tapered, when viewed from behind, distinctly bidentate. Anterior face of petiole glabrous, posterior face with rugae or carinulae. Postpetiole nodiform, in profile with a ventral tooth and one additional acute tooth at the posterior dorsum. First gastral tergite shagreened throughout.

Dorsum of head anteriorly feebly rugulose, posteriorly reticulate-rugulose, width of meshes ca. 25 - 50 µm. Secondarily head covered with distinct shagreening. Promesonotal shield and postpetiole reticulate-rugulose above, shining, without shagreening, width of meshes ca. 25 - 60 µm. Dorsal surface near posterior mesonotal margin rugose. Entire dorsum of individuals covered with dense pubescence of suberect to erect, on head ca. 100 - 150 µm, on alitrunk ca. 150 - 200 µm, on gaster ca. 150 - 250 µm, apically arcuate hairs, and few longer outstanding hairs (ca. 0.3 - 0.4 mm), which distinctly surpass the pubescence.

Colour of body usually of a uniformly greyish brown.

**Differential diagnosis:** This species may only be mistaken for the related *Meranoplus bellii*, from which it can readily be separated by the mesonotum posteriorly overhanging

the propodeum, in profile by the narrower postpetiole, and by the gastral microreticulation. Furthermore the range of its distribution is different. From all remaining species it is separable by the bidentate petiole.

**Distribution** (Fig. 32): Thailand, Malaysia, Indonesia, Brunei.

***Meranoplus laeiventris* EMERY (Figs. 8, 22, 30)**

*Meranoplus laeiventris* EMERY, 1889: 506, pl.10, fig. 16 (worker). - BOLTON 1995: 251 (catalogue). - **Lectotype** worker (MCSN), **by present designation**: "Tenasserim M. Mooleyit, 1000-1900 m. Fea. Apr. 1887 \ TYPUS \ *Meranoplus laeiventris* Em. n. sp \ Museo Civico di Genova". 1 **paralectotype** worker, "Tenasserim. Kawkareet Fea. Maggio 1887. \ *Meranoplus laeiventris* Em \ Collect. G.Mayr \ *laeiventris* Emery, Type." in NHMW.

*Meranoplus laeiventris* var. *punctulatus* EMERY, 1895: 472 (worker) (Carin Chebà, Myanmar). - BOLTON 1995: 251 (catalogue). - **Lectotype** worker (MCSN), **by present designation**: "Carin Chebà 900-1100 m. L.Fea I 89 \ *Meranoplus laeiventris* var *punctulatus* Emery \ Museo Civico di Genova". 2 **paralectotype** workers (MCSN, NHMW), same locality data as lectotype. - (= **syn.n.**)

**Type locality**: Tenasserim, Kawkareet, Myanmar [= Burma].

**Additional material examined** (110 workers): **Myanmar** [= Burma]: Upper Burma, Mandalay, VII.1899, leg. Bingham (BMNH) (2 ♂♂). **Thailand**: Doi Pui, 1350 m a.s.l., 15.IV.1981, leg. Brown & Burikam (MCZC) (6 ♂♂); Nong Hoi, 27.VII.1975, leg. Jackson (BMNH) (12 ♂♂); Doi Suthep (OLL) (1 ♂), *ibid.*, 7.IX.1964, leg. Brandt (NHMW) (3 ♂♂); Chiang Mai Province, Doi Suthep NP, nr. Wat Doi Suthep, 900 m a.s.l., 1.XI.1995, leg. Zettel (NHMW, MHNG) (17 ♂♂); Chiang Mai Province, Doi Suthep NP, nr. Ruesse Cave, 5.XI.1995, leg. Zettel (NHMW) (21 ♂♂); Doi Suthep, 875 - 950 m a.s.l., 15.VII.1962, leg. Ross & Cavagnaro (16 ♂♂) (CASC); Chiang Mai Prov., Munthatan Falls, 13.VIII.1992, leg. Furth (MCZC) (15 ♂♂); Chiang Mai Prov., Pau Pau Falls, 13.VIII.1992, leg. Furth (MCZC) (1 ♂); Tak Prov., Doi Musoe, 12.VIII.1992, leg. Furth (MCZC) (10 ♂♂); N. Thailand, Chiang Mai, 10 km E Mae Chaem, Doi Inthanon NP, 1000 m a.s.l., 1.I.1995, leg. Schulz & Vock (CASL); Chiang Mai Prov. 12 km NNW Chom Thong, 800 m a.s.l., 1.I.1995, leg. Schulz & Vock (CASL, NHMW). **Laos**: N-Laos, Prov. Lg. Nam Tha, ca. 25 km SE Muang Sing, 900 m a.s.l., 22. VI. 1996, leg. Schillhammer (NHMW).

**Description** (worker): TL: 4.1 - 4.5, HL: 0.98 - 1.07, HW: 0.95 - 1.05, CI: 93 - 100, SL: 0.75 - 0.8, SI: 73 - 80, PML: 0.6 - 0.8, PW: 0.75 - 0.85, PMI: 134 - 142, AL: 0.95 - 1.17 (15 measured).

Mandibles striate, armed with four teeth. Mid-portion of clypeus shining, concave, laterally with few rugae or wrinkles; anterior clypeal margin produced into a narrow entire apron. Frontal triangle a narrow, brilliant and striate, arcuate furrow between clypeus and frons. Head above antennal scrobes trapezoid, lateral sides evenly narrowed towards clypeus; ventral part of head (below antennal scrobes) wider, more rectangular, the genae thus distinctly protruding and visible from above. Antennal scrobes roughly carinulate, the genae rugulose. Compound eyes situated behind middle of lateral sides of head, not close to posterior corners. Maximum diameter of eye 0.19 - 0.23, with 13 - 14 ommatidia in its longest row. Dorsum of head anteriorly rugulose, towards occiput reticulate-rugulose, width of meshes ca. 50 - 80 µm.

Promesonotum slightly wider than long, distinctly converging posteriorly, provided with lateral and posterior projections. Margins of promesonotal shield overhanging sides of alitrunk laterally and propodeum posteriorly. Anterior pronotal corners produced into stout teeth followed by the sinuate pronotal margin. A distinct lateral constriction is

situated at about the level of (invisible) promesonotal suture. At the same level a translucent fenestra on each side of the lateral margin is apparent. Posteriorly, the lateral margins of the mesonotum are provided with a blunt, massive projection on each side. Posterior mesonotal corners produced into short spines, directed ca. 45° from the shield, and on the posterior margin the mesonotum with a pair of paramedian straight, short spines. Declivity of propodeum brilliant throughout, with a very faint shagreening and occasional transverse or longitudinal rugae which especially are found beneath the posterior mesonotal margin between the propodeal spines. Long, considerably diverging propodeal spines situated high on the lateral sides of propodeum, distinctly above middle; when viewed in profile slightly arcuate. No suture between dorsal alitrunk and propodeum is apparent on the declivity when viewed from behind. Dorsum of promesonotum reticulate-rugulose, the meshes of about same size or slightly wider than those on head (ca. 50 - 80(100) µm).

Petiole distinctly truncate, in lateral and dorsal view quadrangular. Anterior face of petiole without structure, the dorsum, sides and posterior face roughly rugulose, the posterior declivity near base somewhat more costulate. Postpetiole nodiform, reticulate throughout, width of meshes ca. 30 - 50 µm. First gastral tergite glabrous, occasionally with inconspicuous shagreening, especially anteriorly and around hair-pits ("*punctulatus*").

Pubescence of entire dorsum consisting of thin, whitish, moderately long hairs (ca. 200 - 300 µm) and few outstanding, distinctly longer (-400 µm) ones. Colour of a dark brown to piceous black, frequently the head, alitrunk, petiole and appendages somewhat brighter.

**Differential diagnosis:** *Meranoplus laevis* is the only Oriental species known from continental Asia to possess a quadrangular petiole in profile. This trait in addition to the dark colour and the shape of the promesonotum makes it distinctive from all its congeners.

**Distribution** (Fig. 30): Myanmar, Thailand, Laos.

### *Meranoplus levis* DONISTHORPE (Figs. 9, 23, 31)

*Meranoplus levis* DONISTHORPE, 1942: 455 (worker). - BOLTON 1995: 251 (catalogue). -

**Holotype worker** (BMNH; examined): "Dohnavur, 350' Tinnevely Dt. S. India I-X-38 [overleaf:] B.M.-C.M. Expdn. to S. India, Sept.-Oct., 1938 \ Holotype \ Type *Meranoplus levis* Donis. H. Donisthorpe det. 10.III.42. \ B.M. TYPE HYM. 11.445".

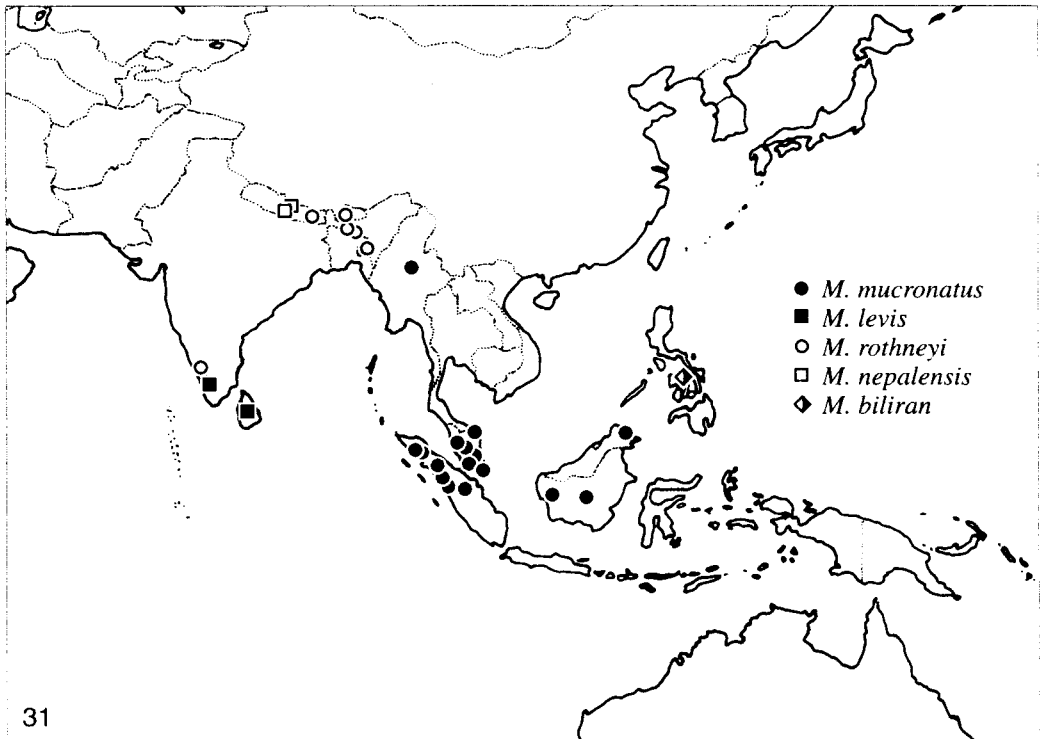
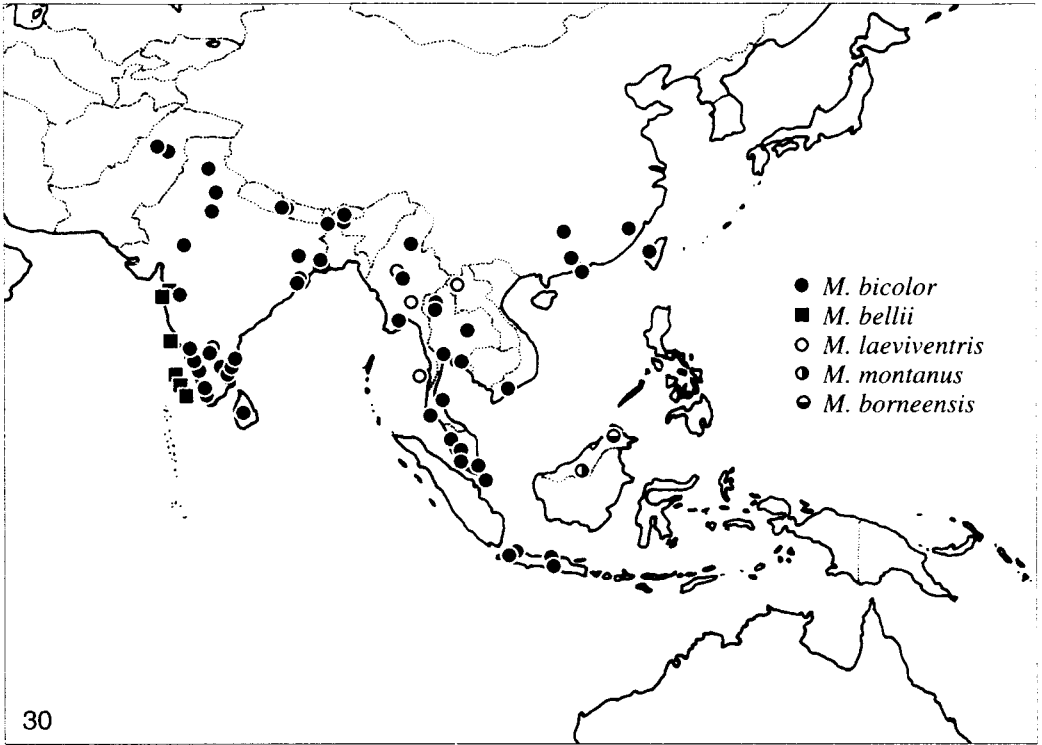
**One paratype worker**, same locality data, in BMNH. One worker (MCZC), labelled "Ceylon; S.P. Hambantota, T.B.F. 7. Feb 09" and subsequently provided with labels, "MCZ Paratype 29499", is mentioned in the original description, but it cannot be regarded as a type specimen.

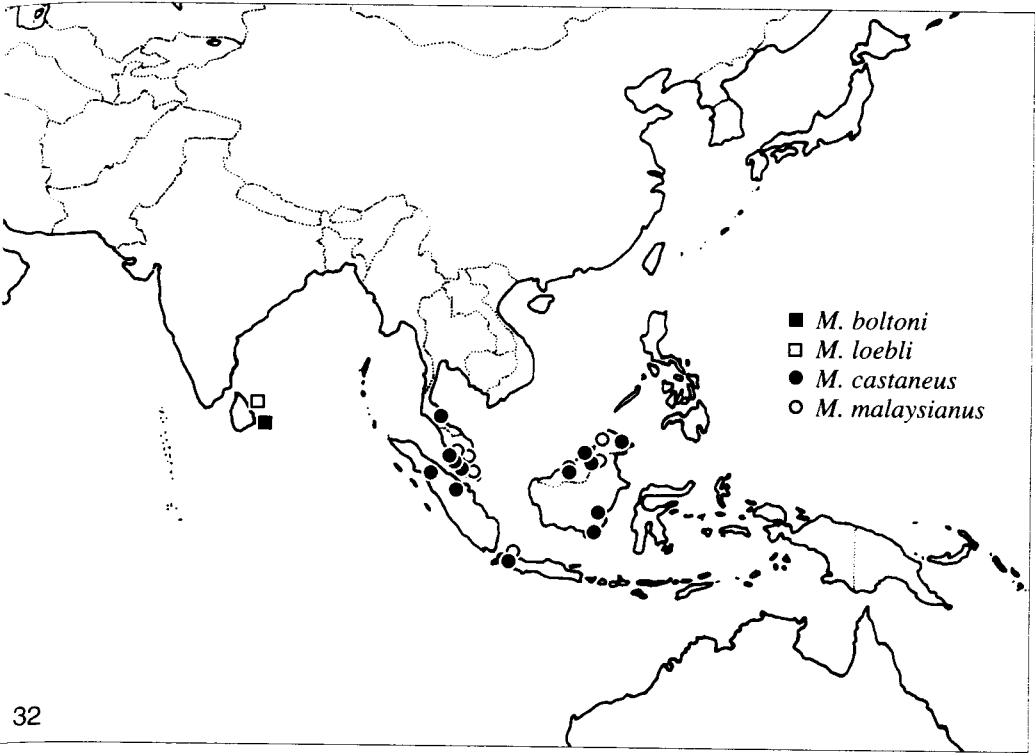
**Type locality:** Dohnavur, Tinnevely District [= Tirunelveli], Tamil Nadu, India.

**Additional material examined** (7 workers): **Sri Lanka:** Hambantota, 7.II.1909, leg. Fletcher (BMNH, MCZC) (2 ♂♂); Valleygatha, 14.VIII.1988, leg. Bolton (BMNH, NHMW) (5 ♂♂).

**Description:** (worker): TL: 4.0 - 4.3, HL: 0.93 - 0.95, HW: 0.95 - 1.03, CI: 102 - 108, SL: 0.7 - 0.75, SI: 73 - 74, PML: 0.85 - 0.88, PW: 1.07 - 1.13, PMI: 125 - 129, AL: 1.05 - 1.07 (2 measured).

Mandibles striate, armed with four teeth; occasionally with an additional basal offset denticle. Mid-portion of clypeus shining, without structure, laterally with few longitudinal carinulae. Anterior clypeal margin sharp-edged. Frontal triangle reduced to an arcuate furrow. Above antennal sockets an indistinct translucent fenestra is apparent. Head above antennal scrobes trapezoid, lateral margins of frons lamellate and translucent, narrowed





Figs. 30 - 32: Distribution of *Meranoplus* species.

towards clypeus. Posteriorly the margin produced into acutely angled occipital corners. Head below antennal scrobes protruding, the genae rounded, distinctly visible from above. Antennal scrobes smooth, posteriorly shagreened, with occasional rugae. The genae roughly rugose. Compound eyes situated in posterior half of lateral sides of head. Maximum diameter of eye 0.21 - 0.22, with 13 - 15 ommatidia in its longest row. Dorsum of head smooth medially, delicately longitudinally carinulate, the lateral lamellate margins with transverse rugae; extreme occipital region rugulose-reticulate.

Promesonotum slightly wider than long, rectangular in dorsal view, its dorsum smooth, distinctly carinulate; the carinulae arcuate, arranged somewhat concentric, in anterior and middle parts of the disc transversely arranged, near sides more longitudinally so. Margins of promesonotal shield sinuate, lateral sides distinctly lamellate and translucent, overhanging sides of alitrunk laterally and propodeum posteriorly. Dorsal surfaces of lamellate areas rugulose-reticulate. Anterior pronotal corners acutely angled, followed by the slightly sinuate, entire margin. Promesonotal suture invisible. Posterior mesonotal corners with two slightly arcuate, posteriorly directed, massive spines. Declivity of propodeum not visible from above, mostly smooth, with a faint shagreening above, and with occasional laterally arranged longitudinal rugae or carinulae. Propodeal spines slender, slightly arcuate, situated in about middle of lateral sides of propodeum. An arcuate suture between dorsal alitrunk and propodeum is distinctly apparent on the declivity below posterior mesonotal margin, when viewed from behind.

Petiole distinctly tapered in lateral view, ventral petiolar face with a conspicuous median, translucent carina; the petiolar crest, when viewed from above, an arcuate line. Anterior and posterior faces of petiole smooth. Postpetiole in profile elongately nodiform, rugulose throughout, somewhat toothed antero-ventrally. First gastral tergite, in particular anteriorly, longitudinally carinulate with numerous transverse meshes, and shagreened throughout.

Pubescence of entire dorsum consisting of softer whitish, rather short, decumbent, arcuate hairs (ca. 100 - 150(200  $\mu\text{m}$ )) and longer, stiff, outstanding setae (ca. 150 - 300  $\mu\text{m}$ ). Body distinctly bicoloured with the head, alitrunk, petiole, postpetiole and appendages brightly ferrugineous, the gaster piceous.

**Differential diagnosis:** *Meranoplus levis* is different from all other species in the Oriental Realm by the carinulate (non reticulate-rugulose) head and promesonotal shield. Its closest relative is nowhere found in the Oriental or Indo-Australian Regions, but is *Meranoplus mayri* from Madagascar, with which it shares similarities in the external morphology and the striation on head and promesonotal shield.

**Distribution** (Fig. 31): Southern India, Sri Lanka.

### *Meranoplus loebli* sp.n. (Figs. 13, 27, 32)

**Type locality:** Hasalaka, Central, Sri Lanka.

**Type material:** **Holotype worker** (MHNG), "Ceylan Central 59 Hasalaka m 250 \ 11.2.1970 Löbl \ MERANOPLUS \ Ceylan 59 Central HASALAKA 11.II.70 m 250 MUSSARD BESUCHET LÖBL"; **paratypes:** 9 workers, same locality data as holotype (BMNH, MCZC, NHMB, MHNG, NHMW); 8 workers, "Ceylan Central Kandy m 600 3c \ 15.1.1970 Löbl" (MHNG, NHMW); 10 workers, "Ceylan Central 18 Kandy m 600 3a \ 15.1.1970" (MHNG, NHMW); 5 workers, "Ceylan Central 18 Kandy m 600 \ 22.1.1970 Löbl" (MHNG, NHMW); 10 workers, "Ceylan Central 10 Peradeniya m 550 \ 19.1.1970 Löbl" (MHNG, NHMW); 1 worker Ceylan Eastern Kantalai 40 \ 2.2.1970 Löbl" (MHNG); 1 worker, "Ceylan Central 68 Horton Plains m 2100 \ 15.2.1970 Löbl \ MERANOPLUS \ CEYLAN 68 Central HORTON PLAINS 15.II.70 m 2100 MUSSARD BESUCHET LÖBL" (MHNG).

**Description:** Holotype worker: TL: 3.4, HL: 0.75, HW: 0.78, CI: 104, SL: 0.56, SI: 72, PML: 0.6, PW: 1.07, PMI: 179, AL: 0.78.

Paratype workers: TL: 2.87 - 3.5, HL: 0.73 - 0.75, HW: 0.73 - 0.78, CI: 100 - 104, SL: 0.53 - 0.58, SI: 71 - 77, PML: 0.55 - 0.6, PW: 1.0 - 1.08, PMI: 178 - 191, AL: 0.65 - 0.78 (14 measured).

Mandibles striate, armed with four teeth. Mid-portion of clypeus rugulose-reticulate, slightly concave. Anterior clypeal margin produced into a lamellate, medially excavated apron. Frontal triangle reduced to an arcuate, rugose furrow between clypeus and frons. Head above antennal scrobes rectangular, posteriorly parallel-sided, slightly constricted above eyes; anteriorly the somewhat lamellate lateral frontal margins narrowed towards clypeus. Ventral part of head (below antennal scrobes) except for protruding eyes concealed by lateral margins of frons, thus not visible from above. Antennal scrobes shagreened, posteriorly with transverse rugae. Genae reticulate-rugulose. Compound eyes situated behind middle of lateral sides of head rather close to posterior corners. Maximum diameter of eye 0.16 - 0.18, with 9 - 10 ommatidia in its longest row.

Promesonotum conspicuously wider than long, the lateral margins rounded, converging posteriorly. Lateral sides of promesonotal shield foliaceous, distinctly overhanging the



alitrunk laterally and propodeum posteriorly. Anterior pronotal corners produced into stout, anteriorly projecting teeth. Posteriorly to these teeth the lateral margins considerably widened and finally sinuately converging. At about level of (invisible) promesonotal suture lateral margins feebly constricted, with a large lamellate, translucent fenestra. A second, slightly smaller or equal sized fenestra is situated at the lateral margin in front of posterior corners of the shield. Posterior corners of mesonotum produced into stout, acute, posteriorly directed projections. Hind margin provided with a pair of paramedian blunt teeth which reach about the same level as posterior mesonotal spines. Paramedian teeth surrounded by a translucent, well developed lamella. Declivity of propodeum smooth, at the antero-lateral corners with a few rugae. Lateral propodeal spines short and acute, situated in middle of propodeal length. The lateral parts of an arcuate suture between dorsal alitrunk and propodeum are apparent on top of the declivity immediately beneath the posterior mesonotal margin, when viewed from behind.

Petiole cuneate from base to crest, its anterior and posterior faces smooth. Postpetiole nodiform, rugulose except for anterior face. Entire first gastral tergite with a faint reticulate shagreening.

Dorsum of head and alitrunk strongly reticulate-rugulose, width of meshes on head ca. 20 - 60  $\mu\text{m}$ , on promesonotal shield ca. 50 - 80(120)  $\mu\text{m}$ . Pubescence consisting of sub-erect, thin, whitish hairs of variable length between ca. 150 - 300  $\mu\text{m}$  and additional very long (0.4 - 0.5 mm) hairs. Unfortunately in most specimens the pilosity is either in very bad condition or abraded. Most individuals are bicoloured with the gaster dark brown and the remainder of body brightly ferruginous.

**Differential diagnosis:** The species is very distinctive by the foliaceous broad promesonotal shield and thus readily separable from all its other Oriental congeners.

**Distribution** (Fig. 32): So far only known to occur on the island of Sri Lanka.

**Derivatio nominis:** Named for Dr. I. Löbl (MHNG), one of the co-collectors of this interesting new species, who also kindly provided the author with numerous additional material.

### *Meranoplus malaysianus* sp.n. (Figs. 4, 18, 32)

**Type locality:** Kuala Lumpur, Malaysia.

**Type material:** **Holotype worker** (BMNH), "litter sample K.L. Univers. \ MALAYA Kuala Lumpur 8.X.73 B.Bolton"; **paratypes:** 10 workers, 1 queen, same locality data as holotype (BMNH, NHMW); 3 workers, "Berlese funnel \ MALAYA K. Lumpur 8.X.1973 B. Bolton \ *Meranoplus* sp. det. B. Bolton, 1974" (NHMB, NHMW); 5 workers, "MALAYSIA Neg. Sembilan Pasoh For. Res. xi.1994 \ litt. sample M.Brendell K.Jackson S.Lewis (BMNH, NHMW); 4 workers, 2 queens, 1 male (head missing), "Damm. Depok 7.I. [1 ex. 30.III.] 1923 \ MCZ Museum of Comparative Zoology" (MCZC, NHMW); 3 workers, "F192-387 \ Kebun Raya Bogor W-Java INDONESIA \ Jan 11-31 1992 F. Ito (CSYK, NHMW).

**Additional material studied** (22 workers, 2 queens): **Malaysia:** Pahang: Fraser's Hill, ca 1300 m a.s.l., hill forest. 16.VIII.1967, leg. Crozier (MCZC) (1  $\phi$ ). Sabah: Kibongal Valley, 7 km N Tambunan. 20.V.1987, leg. Löbl & Burckhardt (MHNG) (1  $\phi$ ); Poring Hot Springs. 9./12.V.1987, leg. Burckhardt & Löbl (MHNG, BMNH, NHMW) (12  $\phi\phi$ ); Poring, Kinabalu Park, 600 m a.s.l., 26.X.1996, leg. Kikuta (CSYK) (2  $\phi\phi$ , 1  $\phi$ ). Sarawak: Gunung Mulu NP, 4th Division, V.-VIII.1978, leg. Hammond & Marshall (BMNH, NHMW) (5  $\phi\phi$ ); Tower Region, Lambir NP, Miri, 12.I.1993, leg. Yamane (CSYK) (2  $\phi\phi$ , 1  $\phi$ ).

**Description:** Holotype worker: TL: 2.75, HL: 0.6, HW: 0.65, CI: 108, SL: 0.45, SI: 69, PML: 0.45, PW: 0.6, PMI: 133, AL: 0.55.

Paratype workers: TL: 2.3 - 2.87, HL: 0.6 - 0.7, HW: 0.63 - 0.73, CI: 102 - 108, SL: 0.4 - 0.48, SI: 62 - 69, PML: 0.45 - 0.53, PW: 0.58 - 0.7, PMI: 114 - 136, AL: 0.5 - 0.58 (15 measured).

Paratype queens: TL: 3.0 - 3.1, HL: 0.65 - 0.7, HW: 0.7, CI: 100 - 108, SL: 0.43 - 0.45, SI: 61 - 64, PW: 0.7 - 0.73, AL: 0.75; widest diameter of compound eye 0.180 - 0.185, with 10 ommatidia in the longest row. Distance between inner margins of lateral ocelli 0.214 - 0.220 (3 measured).

Mandibles striate, armed with four teeth. Mid-portion of clypeus vertical and slightly concave, covered with a rough reticulum. Lateral sides of clypeal mid-portion, where meeting lateral clypeal parts acutely boarded, occasionally denticulate, the anterior margin very narrowly margined. Frontal triangle vestigial, only an arcuate, smooth furrow between clypeus and frons apparent. Head above antennal scrobes rectangular, posteriorly parallel-sided, lateral margins above eyes slightly sinuate, anteriorly the sides of head narrowed towards clypeus. Ventral to the antennal scrobes the head similarly shaped, the genae not protruding, hardly visible from above. Frons above antennal sockets with a smooth, hyaline, transparent fenestra on each side of postero-lateral margin of clypeus. Antennal scrobes especially in posterior half with few transverse carinulae. Genae rugulose. Compound eyes situated behind, but close to middle of lateral sides of head. Maximum diameter of eye 0.16 - 0.19, with 7 - 9 ommatidia in the longest row.

The dorsal promesonotum rectangular, wider than long. The promesonotal shield distinctly margined, broadly transparent at the sides, overhanging alitrunk laterally and propodeum posteriorly. Anterior corners of pronotum acutely angled, almost rectangular. Lateral sides of pronotum parallel, slightly sinuate. At level of (invisible) promesonotal suture the promesonotal shield laterally constricted, with a transparent fenestra on each side close to the margin, and usually the transparent spot connected with the lamellate margins. Mesonotum anteriorly shortly parallel-sided as well, posteriorly angulately converging, followed by a concavity. At level of the concavity near lateral sides with a second, similarly shaped and similarly sized lamellate fenestra. Hind margin of mesonotum undulated, with very blunt paramedian projections, and with a median transverse translucent area. Declivity of propodeum entirely smooth, meeting the dorsum of alitrunk in a right angle. The suture between dorsal alitrunk and propodeum is situated exactly in point beneath mesonotal hind margin, where they meet, and thus not visible, when viewed from behind. Lateral propodeal spines short and acute, situated above middle of propodeal length.

Petiole in lateral view tapered, the crest obliquely and narrowly truncate. Anterior petiolar face smooth, the dorsum and lateral sides rugulose, the posterior face smooth, with occasional longitudinal rugae. Postpetiole nodiform, reticulate-rugulose, weaker so in specimens from Borneo. First gastral tergite entirely smooth, with only an occasional faint shagreening around hair-pits (type material), or with variably developed shagreening in specimens from Borneo.

Dorsum of head and promesonotal shield densely reticulate-rugulose. Width of meshes on both ca. 30 - 60  $\mu\text{m}$ . Lateral margins and hind margin of the shield smooth, except for some rugae. Entire dorsal surface covered with dense, suberect to erect, regular whitish pubescence (ca. 100 - 150  $\mu\text{m}$ ), and with only occasional slightly longer hairs of ca. 200  $\mu\text{m}$  length. Colour of individuals uniformly pale (type material) to dark brown.

**Differential diagnosis:** *Meranoplus malaysianus* is very close to the previously described *M. borneensis* but distinctive by the very different pubescence, the propodeal spines mostly situated at a higher level on propodeal sides and the distinctly narrower truncated petiole.

Due to the wide range of its distribution this species shows variation in the outline of the promesonotal shield, the shape of both petiole and postpetiole and the surface of the gaster. The differences are found especially in the material from Borneo, listed above as "additional material". It is therefore possible that a second species is hidden. This can only be confirmed when more material has been studied from larger series.

**Distribution** (Fig. 32): Peninsular Malaysia, Java, Borneo.

**Derivatio nominis:** Named after Malaysia, from where the first specimens of this little species showed up during this survey.

*Meranoplus montanus* sp.n. (Figs. 12, 26, 30)

**Type locality:** Mt. Tibang, on the border Sarawak / Kalimantan, Borneo (Indonesia or E-Malaysia).

**Type material:** Originally three cardboards on one pin. **Holotype worker**, "Mt. Tobangs [sic; ?typing error, ?name outdated] (top) Borneo 1700 m. E. Mjöberg \ MCZ Museum of Comparative Zoology" (MCZC); 2 **paratypes** (worker, queen), same data as holotype (MCZC, NHMW).

**Description:** Holotype worker: TL: 3.25, HL: 0.8, HW: 0.78, CI: 97, SL: 0.55, SI: 71, PML: 0.6, PW: 0.75, PMI: 125, AL: 0.75.

Paratype worker: TL: 3.4, HL: 0.8, HW: 0.8, CI: 100, SL: 0.58, SI: 73, PML: 0.63, PW: 0.75, PMI: 119, AL: 0.75.

Paratype queen: TL: 4.18, HL: 0.8, HW: 0.84, CI: 105, SL: 0.63, SI: 75, PW: 0.75, AL: 1.05; widest diameter of compound eye 0.25, with 14 ommatidia in the longest row. Distance between inner margins of lateral ocelli 0.3.

Mandibles striate, armed with four teeth. Mid-portion of clypeus roughly reticulate, anteriorly vertical and slightly concave. Anterior clypeal margin produced into a narrow translucent apron. Frontal triangle vestigial, apparent as an arcuate, carinulate furrow. Head above antennal scrobes rectangular, posteriorly parallel-sided, anteriormost narrowed towards clypeus, occipital corners slightly diverging. Ventral to the antennal scrobes the head of similar shape, the genae somewhat rounded, very inconspicuously protruding and only hardly visible from above. Dorsum of head anteriorly rugose, posteriorly reticulate-rugulose, width of meshes ca. 30 - 80  $\mu$ m. Antennal scrobes smooth, transversely carinulate in most of their length. The genae reticulate-rugulose. Compound eyes situated in middle of lateral sides of head. Maximum diameter of eye 0.2 - 0.21, with 11 ommatidia in the longest row.

Promesonotum rectangular, slightly wider than long, the promesonotal shield overhanging sides of alitrunk laterally and propodeum posteriorly. Anterior corners of pronotum acutely angled, almost rectangular, produced into stout teeth. Lateral sides of pronotum sinuate, at about level of (invisible) promesonotal suture the promesonotal shield laterally constricted. At level of constriction with a small transparent fenestra on each side, situated very close to

the margins. Mesonotum anteriorly parallel-sided, followed by massive, stout, posteriorly directed, somewhat blunt projections. Posterior mesonotal corners provided with arcuate, posteriorly directed short spines. Posterior margin of the shield with paramedian, short, acute teeth, medially between them a deep excavation. Dorsum of promesonotum densely reticulate-rugulose, width of meshes ca. 60 - 80  $\mu\text{m}$ . Declivity of propodeum meeting the dorsum of alitrunk in a right angle, its surface glabrous, partly faintly shagreened, and with striae and wrinkles below the mesonotal hind margin. The short, acute propodeal spines situated above middle of lateral sides of propodeal length. An arcuate suture between dorsal alitrunk and propodeum is indistinctly apparent at the top of the propodeal declivity right beneath the mesonotal hind margin, when viewed from behind.

Petiole in lateral view tapered, the crest oblique. Anterior petiolar face smooth. Lateral sides and behind the crest reticulate, posterior petiolar face carinulate. Postpetiole nodiform, reticulate-rugulose. First gastral tergite entirely shagreened, anteriorly sometimes with a faint, minute reticulum.

Entire dorsal surface covered with decumbent to suberect, dense, whitish pubescence, the hairs ca. 100 - 150(200)  $\mu\text{m}$  long. Colour uniformly dark brown, the appendages brighter.

**Differential diagnosis:** This species is well characterized among its congeners by the distinctive shape of the promesonotal shield (Fig. 12). Furthermore it is different from *M. biliran*, its closest relative, by the anterior clypeal margin not being serrate.

**Distribution** (Fig. 30): Known only from the type locality.

**Derivatio nominis:** Named after the "noteworthy circumstance" that this species was found on a mountain (the name of which given on the label obviously is wrong or outdated).

### *Meranoplus mucronatus* F. SMITH (Figs. 1, 15, 29, 31)

*Meranoplus mucronatus* F. SMITH, 1857: 82, pl.2, fig.6 (worker) - VIEHMEYER 1916: 129 (male), BOLTON 1995: 251 (catalogue). - **Holotype worker** (BMNH; examined): "MT OPHIR 24 \ Holotype \ mucronatus Smith \ B.M. TYPE HYM. 11.442".

**Type locality:** Mt. Ophir [= Gunong Ledang], Johor, Peninsular Malaysia.

**Additional material examined** (660 workers): **Myanmar** [= Burma]: "Burmah" (MCZC) (1  $\phi$ ). **Thailand:** Probably South Thailand: "Siamese Malay States, 1903-127, Annandale & Robinson" (BMNH) (2  $\phi\phi$ ). **Malaysia:** Negeri Sembilan: Pasoh, Pasoh Forest Res., I.1994, leg. Brendell, Jackson & Lewis (BMNH) (4  $\phi\phi$ ); "Gunung Angsi, S Seremban, leg. Overbeck (ZMHB) (11  $\phi\phi$ ). Selangor: Gombak, 26.IX.1973, leg. Bolton (NHMB) (2  $\phi\phi$ ), *ibid.*, I.1986 (BMNH) (3  $\phi\phi$ ); Ulu Gombak, 2.VIII.1967, leg. Crozier (MCZC) (23  $\phi\phi$ ), *ibid.*, 2.-21.VI.1970, leg. Tobler (CASC, NHMW) (297  $\phi\phi$ ), *ibid.*, 16.II.1993, leg. Zettel (NHMW, MHNG) (13  $\phi\phi$ ); Kuala Lumpur, 27.-31.VII.1921, leg. Pendlebury (NHMB) (1  $\phi$ ), *ibid.*, Batu caves, 15.IX.1921, leg. Pendlebury (NHMB) (1  $\phi$ ), *ibid.*, IX.1964, leg. Krauss (USNM) (7  $\phi\phi$ ); 16 miles NE Kuala Lumpur, 1000 feet, 12.VIII.1962, leg. Ross & Cavagnaro (CASC, NHMW) (70  $\phi\phi$ ); 22 miles NE Kula Lumpur, 600 m a.s.l., 9.VI.1962, leg. Ross & Cavagnaro (CASC) (50  $\phi\phi$ ). Perak: NW Bukit Maxwell near Taiping, 8.VII.1983, leg. Ross (CASC, NHMW) (20  $\phi\phi$ ); Genting Highlands, Sri Layan, 900 m a.s.l., 1.IV.1981, leg. W.L.Brown (MCZC) (4  $\phi\phi$ ). Kelantan: "Kelantan" (NHMW) (1  $\phi$ ); Malacca (MNHN) (11  $\phi\phi$ ). Pahang: Fraser Hill "Gap", 1180 m a.s.l., 11.II.1992, leg. Schillhammer (NHMW) (4  $\phi\phi$ ), *ibid.*, 1 km W "Gap", 750 - 850 m a.s.l., 8.II.1992, leg. Schillhammer (NHMW) (1  $\phi$ ); Taman Negara NP, 5.IX.1974, leg. Perrault (MNHN) (2  $\phi\phi$ ); Malacca, leg. Martin (NHMB) (1  $\phi$ ), *ibid.*, Gunung Angsi (NHMB) (1  $\phi$ ); Kuala Tahan, 21./24.XI.1921, leg. Pendlebury (NHMB) (2  $\phi\phi$ ). Johor: 10 km W Jemaluang, 30.VI.1983, leg. Ross (CASC) (2  $\phi\phi$ ). Sabah: Sandakan (MCZC) (1  $\phi$ ), *ibid.*, leg. Baker (USNM) (2  $\phi\phi$ ). **Indonesia:** Sumatra: "Sumatra" (NHMW) (2  $\phi\phi$ ); "Sumatra, Moesch" (USNM) (1  $\phi$ ). "Ajer Mantcior", VIII.1878, leg. Beccari (MNHN) (1  $\phi$ ). Langkat, east coast, "Namoe Dengas, 12.II", leg. Jourin (CASC,

MCZC) (16 ♂♂). Bandar (ZMHB, NHMB) (3 ♂♂); "Moeara Mahat", 1937, NGS SI Exp., leg. Mann (USNM, NHMW) (7 ♂♂); "Kota Nopan", 1937, NGS SI Exp., leg. Mann (USNM, NHMW) (4 ♂♂); N-Sumatra, Gunung Leuser NP, Ketambe, 22.II.1990, leg. Schillhammer (NHMW) (1 ♂); W-Sumatra, Lembah Anai, W Padang Panjang, 12.II.1991, leg. Schillhammer (NHMW) (1 ♂); Indrapura [= Siak Sri Inderapura], leg. Tritschler (ZMHB) (2 ♂♂); Pematang Siantar, 1937, NGS SI Exp., leg. Mann (USNM, NHMW) (45 ♂♂); Bankinang, 1937, NGS SI Exp., leg. Mann (USNM) (2 ♂♂); Loeboek Sikaping [= Lubuksikaping], 1937, NGS SI Exp., leg. Mann (USNM, NHMW) (16 ♂♂); Kotabaru, Panti, 1937, NGS SI Exp., leg. Mann (USNM, NHMW) (7 ♂♂). Borneo: W. Kalimantan, Gunung Palung Nat. Res., Sukadana, I.1986, leg. Fujita (MCZC) (9 ♂♂); Banka [= Bangka Isl., E-Sumatra ], leg. Böttger (ZMHB) (3 ♂♂). "Borneo" (MCZC, NHMB) (2 ♂♂).

**Description** (worker): TL: 5.8 - 7.1, HL: 1.4 - 1.7, HW: 1.45 - 1.7, CI: 100 - 110, SL: 1.05 - 1.2, SI: 67 - 74, PML: 1.05 - 1.3, PW: 1.3 - 1.65, PMI: 120 - 128, AL: 2 - 2.5 (20 measured).

Mandibles striate, armed with four teeth. Mid-portion of clypeus distinctly concave, medially smooth, laterally rugose, or entire clypeal mid-portion rugose. Anterior clypeal margin frequently feebly to distinctly emarginate. Frontal triangle broadly apparent, smooth and brilliant. Frons anteriorly with a translucent fenestra above antennal sockets on each side of clypeus. Lateral sides of head above antennal scrobes sinuate above eyes, narrowed towards clypeus, overhanging most of antennal scrobes. Ventral part of head (below antennal scrobes) of similar shape, genae rounded and slightly protruding, indistinctly visible from above. Antennal scrobes glabrous anteriorly, occasionally longitudinally striate, and shagreened posteriorly. Genae reticulate-rugulose. Compound eyes situated behind, though close to middle of lateral sides of head. Maximum diameter of eye 0.28 - 0.34, with 14 - 17 ommatidia in the longest row.

Promesonotum slightly wider than long, the shield overhanging sides of alitrunk laterally and propodeum posteriorly. Anterior and posterior corners of promesonotal shield each provided with a very long, acute spine, which is directed in a ca. 45° angle away from the shield. Thus the shield apparently distinctly constricted in posterior half. Lateral margins each with a translucent lamellate fenestra which is frequently followed by a second one in front of, or at the base of the posterior spines. Promesonotal suture not visible. Posterior margin with a pair of paramedian short posteriorly directed, occasionally bifurcate spines, and with additional shorter, occasionally also bifurcate ones. Declivity of propodeum smooth, frequently with an indistinct shagreening, above lateral spines few longitudinal rugae may occur. Propodeal spines long, very slender and arcuate, considerably diverging, situated somewhat above middle of propodeal length. An arcuate suture between dorsal alitrunk and propodeum is only indistinctly apparent at the top of the propodeal declivity right beneath mesonotal hind margin, when viewed from behind.

Petiole in profile cuneate, in dorsal view the crest a narrow, sharp line, highest in middle, when viewed from posteriorly. Anterior petiolar face covered with a pelt of very fine and short pubescence, posterior petiolar face striate, or its middle smooth, with only lateral rugae. Postpetiole nodiform, strongly reticulate-rugulose. First gastral tergite dull, entirely shagreened, when studied with higher magnification consisting of a minute reticulum.

Dorsum of head and promesonotum reticulate-rugulose, width of meshes ca. 100 - 150 µm. Meshes near margins of shield and around base of spines distinctly elongate. All dorsal surfaces covered with scattered, stiff, suberect to erect, ca. 200 - 500 µm long hairs. Individuals mostly bicoloured with the head, alitrunk, petiole and postpetiole and the appendages ferrugineous or dark brown, the gaster being darker. Uniformly dark brown to piceous individuals may occur.

**Differential diagnosis:** *Meranoplus mucronatus*, the largest species in the treated area, is unique by its markedly armed promesonotal shield (see Figs. 1, 15, 29). Species with a similar armament on the dorsal alitrunk are known only from further easterly regions (see also above introduction).

**Distribution** (Fig. 31): Myanmar, Thailand, Malaysia, Indonesia.

***Meranoplus nepalensis* sp.n. (Figs. 10, 24, 31)**

**Type locality:** Gokarna Forest Reserve, 1350 m a.s.l., Kathmandu, Nepal.

**Type material:** **Holotype worker**, "Gokarnaban 12.6.1976 \ Kathmandu \ Nepal, W. Wittmer C. Baroni Urbani" (NHMB); **paratypes**: 24 workers, 1 queen ("24.5.-21.6."), same locality data as holotype (NHMB, NHMW, MHNG, BMNH, MCZC); 1 worker, "Godavari 1450m 25.5. \ Nepal, W. Wittmer C. Baroni Urbani 76 (NHMB); 1 worker, "Kokarna b. Kathmandu Nepal lg. H. Franz (NHMB); 3 workers, "Nepal-40: Prov. Kosi, Distr. Sankhuwasawa, Tumlingtar, 950mH, 26.04.1984, Leg. I. Löbl, A. Smetana (CASL, NHMW).

**Description:** Holotype worker: TL: 3.2, HL: 0.75, HW: 0.775, CI: 103, SL: 0.6, SI: 77, PML: 0.6, PW: 0.775, PMI: 125, AL: 0.75.

Paratype workers: TL: 3.0 - 3.3, HL: 0.7 - 0.79, HW: 0.7 - 0.83, CI: 100 - 112, SL: 0.55 - 0.61, SI: 70 - 78, PML: 0.58 - 0.68, PW: 0.75 - 0.81, PMI: 119 - 121, AL: 0.65 - 0.75 (20 measured).

Paratype queen: TL: 7.5, HL: 1.25, HW: 1.25, CI: 100, SL: 0.85, SI: 68, PW: 1.7, AL: 1.87; widest diameter of compound eye 0.36, with ca. 20 ommatidia in the (irregular) longest row. Distance between inner margins of lateral ocelli 0.42.

Mandibles striate, armed with four teeth. Mid-portion of clypeus slightly concave, basally smooth and shiny, anteriorly distinctly reticulate, with numerous wrinkles. Anterior clypeal margin produced into a narrow, medially excavated apron. Frontal triangle apparent between posterior clypeal margin and frons, smooth and shining. Head above antennal scrobes almost parallel-sided posteriorly, the sides narrowed anteriorly towards clypeus. Ventral part of head (below the antennal scrobes) of similar shape, genae in full face view not protruding, thus invisible from above. Antennal scrobes smooth anteriorly, with occasional longitudinal carinulae and transverse rugae posteriorly. Genae reticulate-rugulose. Compound eyes situated behind middle of lateral sides of head, not close to posterior corners. Maximum diameter of eye 0.16 - 0.17, with 10 - 11 ommatidia in the longest row.

Promesonotum slightly wider than long, its margins overhanging sides of alitrunk laterally and propodeum posteriorly. Anterior pronotal corners acutely angled, produced into short stout teeth. Promesonotal shield at about level of (invisible) promesonotal suture with a more or less distinct translucent lamellate fenestra on each side which may reach the margin. Posteriorly to the fenestra the lateral margins protruding, followed by a constriction and an additional second translucent and equal sized fenestra. Posterior corners of mesonotum rectangular, posterior mesonotal margin with a pair of paramedian blunt, posteriorly directed short projections. Propodeum distinctly overhung by translucent lamella between posterior mesonotal projections. Declivity of propodeum smooth, with occasional longitudinal carinulae or rugae. Lateral propodeal spines rather long, acute and stout, situated distinctly above middle of propodeal length. No suture between dorsal

alitrunk and propodeum is apparent on the propodeal declivity beneath mesonotal hind margin, when viewed from behind.

Petiole in lateral view considerably tapered from base to crest. Anterior petiolar face smooth. Posterior face behind the crest rugulose, remainder of declivity distinctly carinate. Postpetiole nodiform in lateral view. First gastral tergite distinctly shagreened, particularly so around hair-pits.

Dorsum of head reticulate, somewhat more rugulose anteriorly, width of meshes ca. 30 - 70  $\mu\text{m}$ . Promesonotal shield and postpetiole reticulate-rugulose above, width of meshes ca. 40 - 80  $\mu\text{m}$ . Entire dorsum of individuals with suberect, somewhat irregular, whitish pubescence (ca. 150 - 200  $\mu\text{m}$ ) and sparser long, outstanding hairs (ca. 300 - 350  $\mu\text{m}$ ). Colour uniformly light brown (?callow workers) to dark brown, some specimens bi-coloured with the head and gaster slightly darker than remaining body parts.

**Differential diagnosis:** *Meranoplus nepalensis* differs from other small, similar sized species by the pronotal shield not being armed with distinct spines, by the rugulose clypeus, and by the excavated anterior clypeal margin.

**Distribution** (Fig. 31): So far known only from Nepal.

**Derivatio nominis:** Named after the country of its origin.

### *Meranoplus rothneyi* FOREL (Figs. 7a, b, 21a, b, 31)

*Meranoplus rothneyi* FOREL, 1902: 241 (worker). - BOLTON 1995: 251 (catalogue). - In Forel's collection (MHNG) this species is not present. 1 worker (number of syntypes unknown) (NHMB) is here fixed as **lectotype**: "M. Rothneyi type Forel Cochinchina (Rothney) \ Samlung Dr. F. Santschi Kairouan"; 1 **paralectotype** (NHMW): "Rothneyi Forel, Type. \ Cochinchina [sic; typing error] Coll. G. Mayr \ M. Rothneyi \ Forel Cochinchina (Inde (Rothney))". One (?) syntype worker, "Indien (Cochin) Rothney \ Meranoplus rothneyi Forel \ Paratypus \ Forel det. 1922 [!] \ Zool. Mus. Berlin" (ZMHB).

**Type locality:** Cochinchina, Kerala, India.

**Additional material examined** (29 workers, 5 queens): **Nepal:** Arun Valley, 3500', 13.VI.1954, leg. Swan (CASC, NHMW) (2 ♂♂); Kosi Prov., Sankhuwasabha Distr., NE Kuwapani, 2250 m a.s.l., 24.IV.1984, leg. Löbl & Smetana (CASL) (1 ♀). **India:** Assam: Kaziranga, 75 m a.s.l., 7.-9.V.1976, leg. Wittmer & Baroni Urbani (NHMB, NHMW) (2 ♂♂); Nagaland, 1982 (BMNH) (3 ♂♂). Meghalaya: Darugiri, Garo Hills, 450 m a.s.l., 19.V.1976, leg. Wittmer & Baroni Urbani (NHMB, NHMW) (1 ♀, 3 ♀♀); W Garo Hills, Balphakram NP, 300 - 500 m a.s.l., 25°11'N 90°51'E, 22.-27.V.1996, leg. Jendek & Sausa (NHMW) (1 ♀); Jorhat, 24.II.1941, leg. Cole (MCZC) (6 ♂♂); Chabua, VIII.1944, leg. Cole (MCZC) (4 ♂♂); Barapani Old Road, 1000 m a.s.l., 14.V.1976, leg. Wittmer & Baroni Urbani (NHMB) (1 ♀); Manas, 2000 m a.s.l., 21.X.1978, leg. Besuchet & Löbl (MHNG) (1 ♀). Tripura: Tripura, 1977 (BMNH) (1 ♀). **Bhutan:** Wangdu Phodrang, 1300 m a.s.l., 6.-9.VI.1972, leg. Basel Bhutan exp. (NHMB, NHMW) (3 ♂♂); Phuntsholing, 15.IV.1972, leg. Basel Bhutan exp. (NHMB) (1 ♀); Samchi, 350 - 450 m a.s.l., 7.-11.V.1972, leg. Basel Bhutan exp. (NHMB, NHMW) (2 ♂♂, 2 ♀♀).

**Description** (worker): TL: 2.8 - 3.2, HL: 0.65 - 0.8, HW: 0.66 - 0.73, CI: 90 - 96, SL: 0.49 - 0.55, SI: 73 - 81, PML: 0.5 - 0.55, PW: 0.55 - 0.65, PMI: 110 - 130, AL: 0.6 - 0.73 (10 measured).

Mandibles striate, armed with four teeth. Mid-portion of clypeus oblique, slightly concave and smooth. Anterior clypeal margin produced into a very narrow apron. Mid-portion with lateral carinulae, which run into short denticles in the antero-lateral corners, the

denticles conspicuously projecting forward, when viewed from the side. Frontal triangle apparent, partly carinulate. Head above antennal scrobes trapezoid, the lateral sides evenly narrowed towards clypeus; ventral part of head (below the antennal scrobes) much wider than dorsal part, somewhat more rectangular, the genae distinctly protruding when viewed from above. Antennal scrobes smooth, posteriorly occasionally shagreened and with transverse carinulae, the genae distinctly carinate to rugulose. Compound eyes situated well behind middle of lateral sides of head close to the occipital corners. Maximum diameter of eye 0.18 - 0.22, with 11 - 13 ommatidia in the longest row.

Promesonotum slightly wider than long, overhanging sides of alitrunk laterally and propodeum posteriorly. Lateral margins of promesonotal shield evenly narrowed towards posterior mesonotal corners. At about the level of (invisible) promesonotal suture with a more or less distinct constriction (excavation on each side), followed by a blunt denticle, which may be almost reduced (type material). In that area the lateral margins occasionally lamellate and translucent. Posterior corners of mesonotum produced into stout, posteriorly directed spines of variable size. Propodeum distinctly overhung by the lamella between posterior mesonotal spines. Declivity of propodeum smooth, with few longitudinal rugae or carinulae above. In about middle of its length propodeum provided with two slender, posteriorly projecting lateral spines.

Petiole in lateral view cuneate, in dorsal view the crest a line. Anterior and posterior petiolar faces smooth. Postpetiole nodiform in lateral view. First gastral tergite shagreened (type material), or smooth with a very indistinct shagreening.

Dorsum of head anteriorly longitudinally carinulate to reticulate-rugulose on lateral sides, reticulate posteriorly near occiput, width of meshes ca. 30 - 60  $\mu\text{m}$ , sometimes with a faint secondary shagreening. Promesonotal shield reticulate-rugulose above, the reticulation more developed than on dorsal head, width of meshes ca. 30 - 70  $\mu\text{m}$ . Postpetiole covered with rugae and wrinkles. All dorsal surfaces covered with short and dense, decumbent to suberect pubescence (ca. 80 - 120  $\mu\text{m}$ ) and longer stiff, suberect to erect, outstanding hairs (ca. 150 - 250  $\mu\text{m}$ ). Colour brightly ferruginous (type material; probably callow worker) to darker brown, sometimes slightly bicoloured, with the gaster darker than remaining body parts.

**Differential diagnosis:** This little species is generally well characterized by the promesonotal shield being provided only with a pair of posterior stout spines. In addition with the shape of the head and the clypeal traits it may be placed close to the widely distributed *M. bicolor*. Nevertheless, it is unmistakable with any congener throughout the range of its distribution.

The type material differs slightly from the remaining studied material from northern samples, the dorsum being less distinctly reticulate, the gaster being distinctly shagreened, and the lateral margins of promesonotum being margined conspicuously lamellate. The disjunct distribution (of the material, as studied yet) might indicate that there are two species. Nonetheless the studied material is here treated as one species, since differences are found among northern populations as well. Further material, particularly from the wide distribution gap is needed to determine, whether *M. rothneyi* consists of more than one species.

**Distribution** (Fig. 31): Found in Kerala, in North-east India, Nepal and Bhutan.



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